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THE WILL TO LEARN

AN EXPERIMENTAL STUDY OF INCENTIVES IN LEARNING

BY WILLIAM F. BOOK AND LEE NORVELL
Indiana University

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I. Problem

1. *Historical.* Much has been written concerning the limits of improvement in learning and the factors which condition the rate and amount of gain which may be made. In the various learning studies made during the last twenty-five years many facts have been assembled which throw light upon both these problems. Bryan and Harter,[1] in summarizing the results of their study of learning the telegraphic language, said: "A fact which seems to be highly significant is that years of daily practice in receiving at the ordinary rate will not bring a man to his own maximum ability to receive. The proof of this fact is that a man whose receiving curve has been upon a level for a number of years frequently acquires a much higher rate when required to do so in order to hold a position requiring the higher skill. That daily practice in receiving will not insure improvement is also seen in the fact that inferior operators after being tolerated for years are finally dropped because they do not go far enough above the deadline. One conclusion seems to stand out more clearly from these facts than any other, namely: that in learning to interpret the telegraphic language, *it is intense effort that educates.* This seems to be true throughout the whole length of the curve. Every step in advance seems to cost as much as the former. Indeed each new step seems to cost more than the former."

Senator Stanford in describing his experiences in training and rearing race horses said:[2] "My own idea, and I think it is borne out in practice, is to commence working a colt early, developing its strength with its growth. If the exercise is judicious the colt is not harmed by it. I do not remember a single instance when an animal of mine has been injured by early work. When a breakdown has occurred it has been after a let-up. Let-ups are very dangerous to young fast animals, as their bodies grow during the let-up without corresponding development of strength. And they are very liable to get too much work when their exercise is renewed. My aim is to get the greatest amount of exercise without fatigue, and never to allow it to reach the period of exhaustion. This is secured by *short distance* exercises. *It is the supreme effort that develops.*"

[1]Bryan and Harter, "Studies in the Physiology and Psychology of the Telegraphic Language," *Psychological Review*, Vol. 4, Jan., 1897, p. 50.

[2]Senator Stanford, *Scribner's Magazine*, June, 1896.

In a study of the acquisition of skill in typewriting, 1908, the writer made a detailed analysis of the learning process involved in both the sight and touch methods, by a technique which revealed not merely the specific habits which were developed in the course of the practice, but which showed just how these habits were formed and finally perfected as the learning progressed.[3] Various phenomena and conditions which influenced the learning helpfully and hurtfully were also determined and their exact influence on the rate of improvement described. This study showed that *intense effort efficiently applied to the details of the work* was a necessary condition for improvement in this type of learning. Only when the learners were in first-class condition, feeling good and applying their best efforts to the details of the work, did they succeed in inventing new and better methods of control or varying their former procedure in a helpful way. The plateaus in the learning curve, or periods of non-improvement encountered in the learning, were brought about by a combination of causes, chief among which was found to be a slump in the amount of effort applied to the details of the work. This prevented the learners from inventing the higher and more economical methods of writing employed by an expert, and resulted as a rule in a careless oversight of the details of the work and a consequent failure to practise the writing on the highest plane that was possible for them. Plateaus in this type of learning were found to be unnecessary and the suggestion was made that they could be eliminated from the learning curve if only the learners could be kept sufficiently interested in their work and directed in a way that would enable them to overcome the special difficulties encountered in the learning at the critical stages. The suggestion was also made that interest in improvement as such was an important factor in bringing this about.

Meumann and Ebert[4] in an extensive study of learning to memorize showed that the memory ability of children and adults could be materially improved by a brief amount of laboratory practice. Their subjects ranged in age from 7 to 54 years, and improved their ability to memorize on the average from 20 to 40 per cent during the brief practice periods arranged in the experiments, whereas, as they pointed out, the memory ability of school children and adults in college is improved very

[3]Book, W. F., "The Psychology of Skill," *University of Montana Studies in Psychology*, No. 1, 1908, see especially p. 100-53.

[4]"Economie und Technique des Lernens," *Archive für die Gesamte Psychologie*, Vol. IV, p. 1-232.
Meumann, E., "Psychology of Learning," p. 357-9.

little by all the enormous amount of memory work that is done in the schools. The theoretical reason assigned by Meumann for this lack of improvement in memory ability is that every advance in mental or bodily skill which results from practice is in the last analysis a phenomenon of will.[5] "We profit by continuous practice," he says, "only in proportion as we incite the will to progress or arouse an intention on the part of the learner to improve. The mere repetition of an act even though it be repeated daily is by no means sufficient to bring about an improvement in the execution of the act." The reason why the memory drills in the schools do not result in improvement is that the attention of the learners is not directed towards the improvement itself, but is focussed on the grammar, the arithmetic, or the poems that are to be learned.

That this interest in improvement is a *necessary* factor in acquisition if the learner is to progress beyond the ordinary limits of skill is indicated by Bryan and Harter's findings that between 60 and 65 per cent of those who begin telegraphy become discouraged upon the plateau of the curve just below the main line rate, and by the results of an unpublished study by Dr. H. D. Kitson of Indiana University.[6] He studied the daily output of 40 hand compositors at the Lake Side Press, Chicago, for a period of 12 months and found that under a specially arranged bonus system set up in that establishment the efficiency of every man was increased on the average from 58 to 97 per cent in 20 weeks. All were experienced printers when they entered the plant and had worked at the trade from one to twenty-seven years. The average experience for these men was 10.3 years. But notwithstanding this fact they made a gain in their output in 5 months under the stimulus of a bonus system of 67 per cent over and above the average score made at the end of the first week of service. One man who had worked at the trade 27 years made a gain of 142 per cent. A man who had been working at the trade 14 years increased his rate of work 282 per cent. The most experienced half of these workmen increased their output on the average 50 per cent while the half which had the least experience at the trade (6.3 years) made an average gain per man of 75 per cent. And though they were all considerably below the minimum bonus point in output when they started to work in the plant, the study showed that under the influence of the bonus and a knowledge of their daily score, 21 out of the 40 men had exceeded the bonus point at the end of the fourth

[5] Meumann, E., "Psychology of Learning," p. 360-4.

[6] The writer wishes to acknowledge his special indebtedness and grateful appreciation to Dr. Kitson for the use of this material.

week. In 5 months 35 out of the 40 men had reached this point; 50 per cent of the men had increased their rate far beyond the bonus point and so were receiving the extra pay.

That we have here a genuine case of learning, taking place in men who had worked at the trade some of them as long as 27 years, seems clear. If it were a mere case of speeding up or the expenditure of more effort the results would have been more immediate and the increase would not have been spread out over so long a period of time. That it is a genuine case of learning induced in well-seasoned printers by the desire for improvement and an exact knowledge of their advancement is further shown by the fact that the less experienced half of the workers, those who had worked at the trade on the average only 6.3 years, improved their rate of work 75 per cent while the more experienced half of the group, who had worked at the trade on the average 14.3 years, increased their output only 50 per cent. It is reasonable to conclude that the more experienced workers being more set in their habits and methods of work found it harder to leave their old and less efficient habits of work behind and therefore more difficult to invent the new and better methods of working required to increase their skill.

These and other studies[7] which might be mentioned have indicated pretty clearly that interest in improvement has a direct effect upon the rate and amount of advancement in learning which a given subject will make in his practice. What is needed is more experimental data which will show not merely the amount of effect which this group of factors may produce, but the elements which make it up and the channels through which the improvement comes.

Facts gathered from a rather wide field indicate that even the so-called physiological and mental limits of improvement may be much extended by this group of factors. Thorndike, for example, after reviewing the literature dealing with rate and amount of improvement in learning[8] states that

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[7]G. F. Arps in his ergograph study "Work with Knowledge of Results versus Work without Knowledge of Results" showed that his subjects did more work and worked faster when they had a knowledge of results than they did "under the conditions of ignorance of results." *Psychological Review Monographs*, Supplement, Vol. 28, No. 3, p. 40.

C. H. Judd in his study "Practice without Knowledge of Results" found that greater efficiency occurred when the observer was aware of the conditions underlying the procedure of the experiment. *Psychological Review Monograph*, Supplement, Vol. 7, 1905. See also C. H. Judd, "Practice and Its Effect in the Perception of Illusions," *Psychol. Rev.*, IX, 1902, 27-9.

[8]Thorndike, E. L., "Educational Psychology," Vol. II, p. 178 f.

few if any learners ever reach the limits of improvement for them. "The main reason," he says, "why we write slowly and illegibly, add slowly and with frequent errors, delay our answers to simple questions and our easy decisions between courses of action, make few and uneven stitches, forget people's names and our own engagements, lose our tempers, and the like, is not that we are doing the best that we are capable of doing in that particular. It is that we have too many other improvements to make, or do not know how to direct our practice, or do not *really care enough about the improvement*, or some mixture of these three conditions."

"It is my impression," he continues, "that the majority of men remain far below their limit of efficiency, even when it is decidedly in their interest to approach it, and when they think they are doing the best that they are capable of. I venture to prophesy that the thousand or more bookkeepers in the grocery stores of New York City who have each had several thousand hours of practice in addition, are still, on the average, adding less than two-thirds as rapidly as they could, and make twice as many errors as they would at their limit. It also appears that the majority of teachers make no gain in efficiency after their third year of service, but I am confident that the majority of such people could do very much better than they do. Even in a gain where excellency is zealously sought the assertion that 'I stay at just the same level, no matter how much I practice' probably does not mean that the individual in question has really reached the physiological limit set for him in that function." He concludes, though on purely theoretical grounds, there being no experimental results to throw light on the question, that one of the chief reasons why such individuals do not reach the limits of their improvement is because they are not really interested enough in making further gains and so do not put forth the necessary effort required to invent the new and better methods of work.

William James in his essay on "The Energies of Men" makes a similar theoretical assertion when he maintains that no one has ever succeeded in tapping his full stores of energy, or used all his powers to advantage in the business of learning.[9]

2. *Purpose of Present Experiments*—These quotations emphasize the need for further experimentation in this field and help to make clear the particular problem we desired to investigate in these experiments. Thorndike said he could not prove the assertions made in the paragraphs we quoted since

[9]James, Wm., "The Energies of Men," Religious and Medical Edition, Vol. 3, p. 7-8 and 15-6.

the experiment of subjecting such individuals to practice under proper conditions of method and interest had not been made. But such experiments should be made and it was the purpose of this study to subject the suggestions regarding the dynamic influence of effort in learning and the helpful effect of interest in improvement as such, made by Bryan, Thorndike, Meumann and Book, to a rigid experimental test and if possible to determine the kind and amount of influence which this group of factors may exert upon one's ability to improve. As a sort of corollary to this problem it was hoped that the data gathered would throw some light on the problem of the so-called limits of improvement in the types of acquisition we selected for study as well as on the channels through which this improvement comes.

II. Method

1. *Subjects and Types of Acquisition Studied*—One hundred and twenty-four junior and senior students at Indiana University—48 men and 76 women—were given four simple learning tests, the first involving 75 practice periods, the other three, 45 practices each. The types of acquisition selected were: (1) improving a purely muscular feat, making the small letter "a" accurately and as rapidly as possible; (2) learning to locate and cross out certain letters in a uniform list of disconnected Spanish words; (3) a case of learning where a simple set of psycho-physical habits must be formed and fixed; (4) learning to multiply mentally one two-place number by another.

These four kinds of learning were selected because they represent widely different types of acquisition. The first consists of improving a purely muscular feat, already learned, which on *a priori* grounds does not seem capable of being greatly improved. The second involves discrimination, skill in eye movements and a co-ordination of certain perceptual and motor processes. The third experiment measures the rapidity with which a simple set of psycho-physical habits can be formed and perfected for quick and accurate use. Our fourth experiment was selected because it involved the acquisition of a purely mental feat, i. e., making the combinations involved in mental multiplication, by imaging the numbers and holding them in mind until the process of combining them could be completed and the correct answer written down.

It was believed that, if the influence of the group of factors to be studied in our experiments were determined for each

of these varied types of learning, the results would be fairly indicative of the influence which these factors exert in all types of acquisition.

2. *Length and Distribution of the Practices*—All practices were taken during the regular laboratory periods for the experimental classes in Psychology from 1 to 5 in the afternoon on Monday, Wednesday and Friday of each week. Section I took its practice between 1 and 3 o'clock, Section II between 3 and 5. The practice periods for the different types of acquisition varied from 30 seconds in experiment 1 where 75 practices were taken, to 1 minute in experiments 2 and 3, and 1 minute and a half in experiment 4 where 45 practices were taken at regular intervals on the same days for each section. In experiment 1, twenty-five practices, arranged in the form of 5 tests, were given each day. In experiments 2, 3 and 4, fifteen practices were given each day, with an interval of time allowed between the practices sufficiently long to counteract all fatigue effects. In experiment 1, one minute was allowed for rest after each practice and a 5-minute rest period given between each group of practices. In experiments 2, 3, and 4 two minutes were allowed for rest after each practice and a 10-minute interval given between the tenth and eleventh test on each day. A 7-day interval was also allowed between the close of one experiment and the beginning of the next, to avoid interference effects, and no practice was taken in any of these experiments except during these regular test periods when an accurate record was kept of each subject's complete output, including mistakes.

3. *Special Conditions Imposed*—For the purpose of studying the effect of interest in improvement upon ability to learn, the subjects were divided into two groups referred to throughout this report as Sections I and II. In the first experiment the members of Section II were asked to count their score after each practice in the first 50 trials and to record in a prominent place on their test sheets the number of "a"s made during the practice, and in other carefully planned ways they were interested as much as possible in the improvement they were making. They were also made to feel that they could increase their score in practically every practice and test. The members of Section I were, on the other hand, kept ignorant of their score during these first 50 practice trials by having them fold their papers at the end of each trial in such a manner that they could not see how many rows of "a"s they had made or how large a space had been covered on their test sheets during the practice. They were, however, urged at the beginning of each succeeding

test, the same as the members of Section II, to work as rapidly and conscientiously as they could in every practice and test. But no attempt was made to try to interest the members of this section or any control group in the possibility of their improvement or in the gain they were making.

During the last 25 practice trials in this experiment the procedure for the two sections was reversed. That is to say, at the beginning of the fifty-first practice or eleventh test each member of Section I was given a sheet of paper containing the highest score he had made in any of his previous practices and told that he could surpass this record in each succeeding practice if he made up his mind to do so. The members of this section were also required to count their score after each of the remaining 25 practices and to record it in a prominent place on their test sheets. They were also allowed to keep their test sheets on the table before them while they worked. In this manner and by other specific directions given to the members of this section at the beginning of the last 25 practices, they were interested as much as possible in the gain they were making from trial to trial. The members of Section II were during these last 25 practices kept ignorant of their score by the same method of folding their record sheets used for Section I in the first 50 practices. They were also told before beginning the fifty-first practice to forget, if they remembered, the highest score made in any of their previous practices.

For the other three experiments the procedure was the same except that in the second and fourth experiments Section II was used as a control group in the first two-thirds of the practice and Section I was made the stimulus group.[10] For example, Section I was permitted to count their score in the first 30 tests of these experiments and interested as much as possible in their rate of improvement; Section II was kept ignorant of the progress they were making during these first 30 tests. But at the beginning of the thirty-first test each member of Section II was given the highest score made in any of his previous practices, and interested as much as possible in the possibility and fact of their improvement. This procedure was again reversed in experiment 3 and made the same as in experiment 1, each section in its turn being subjected in the first two-thirds of the practice to the group of incentives provided in

[10]Throughout the rest of this report the section which was exposed to this special group of incentives for the first two-thirds or last third of the practice will be referred to as the stimulus group; the section which was not thus being interested in their improvement, as such, will be called the control group.

our experiments, and in the last one-third of the practice to the other set of conditions as the case might be. This procedure is indicated in Table I, which shows how the two sets of conditions were varied for each section in the different experiments.

TABLE I

Experiment	*Sections*	*First two-thirds of practice*	*Last third of practice*
1	I	Control	Stimulus
	II	Stimulus	Control
2	I	Stimulus	Control
	II	Control	Stimulus
3	I	Control	Stimulus
	II	Stimulus	Control
4	I	Stimulus	Control
	II	Control	Stimulus

4. *Method of Controlling the Conditions*—A special set of directions to the members of each section was prepared for each experiment before the practices began and the procedure to be followed was tried out on a small training group to make sure that the experiment could be successfully carried out as planned and the special set of conditions arranged, controlled. For making the "a"s in the first experiment ordinary 8 x 12 sheets of paper were used and each practice numbered in the center of the page so that the result of each practice could be accurately determined and the record made folded under for the control groups immediately after each trial. These test sheets were taken up in the control groups after each test, which consisted of five separate practices or trials. In this manner we succeeded entirely in keeping the subjects of our control groups ignorant of their score and so from becoming interested in the improvement they were making. The members of the stimulus groups, on the other hand, were required to count their score at the end of each practice and interested as much as possible in their improvement by the special devices to be described in section 5 below.

For experiment 2 a heterogeneous list of Spanish words were printed on uniform sized test sheets. Enough of these sheets were given to each subject at the beginning of each practice period to serve for all practices that day. These were placed face down on the tables and kept so until a signal was given to begin the practice, when the top sheet was turned over and marked as previously directed. Four attendants were

stationed in the room when the tests were given to see that directions were carried out and to collect the papers promptly from the control groups after each test. For the stimulus sections the finished test sheets were turned face down with the score made during the practice marked on the back of the sheet and kept in sight during the rest interval and the following practice. But notwithstanding these and other precautions taken in this experiment to keep the members of our control sections from becoming interested in the gains they were making, there was a tendency on the part of some subjects in our control group to try to keep track of about how far down the page they had gotten in the list of words when time was called. In other words, we did not succeed so completely in experiment 2 in keeping the members of our control groups from becoming interested in the gains they were making as we did in experiment 1.

In experiment 3 the digits to be translated into letters were arranged in series of five-place numbers on a 9 x 12 sheet of paper, in two vertical columns, the numbers to the left, and five spaces directly opposite each number for the five letters which were to be substituted for the digits composing it. The key was placed at the top of the page and the learners were required to begin their substitutions at once without memorizing the key. The test sheets had been thus arranged to facilitate the scoring of the papers. Each number was made of the same degree of difficulty by the proper alternation of the digits used, which fact had unfortunately been explained to the learners before the test began. This made it difficult in this experiment to keep the subjects in our control groups wholly ignorant of their score and consequently from becoming interested in their rate of improvement. All other precautions used in experiments 1 and 2 to control this condition were carefully observed; and when this tendency on the part of our control sections to keep track of the progress they were making was discovered, during the course of the experiment, we arranged to ask the members of each section at the conclusion of the practice whether or not they had succeeded in following the instructions exactly as given them. More than half the members of both control groups in this experiment stated that they could not help but be vaguely aware of their score and could not resist the tendency to keep some track of their improvement by noting how far down in the list of numbers they had gotten in their translation when time was called. Many also stated that they observed themselves trying to go beyond that point in succeeding practices, showing that they were really interested in their rate of gain.

The bearing of these facts on our results will be discussed in the section on results.

In experiment 4 this tendency on the part of our control groups to keep track of their score and to interest themselves in their improvement as such was more successfully broken up. The problems were made equally difficult by taking all possible combinations of the nine digits and arranging them so that the problems would be of the same degree of difficulty on different parts of the test sheets. For our control groups the problems were arranged in the same order as for the stimulus sections but in such a way that there was an unequal number in each row on successive test sheets. To prevent them further from becoming interested in their improvement the learners were told at the beginning of the experiment that the problems were not of the same degree of difficulty but would have to be weighted to determine their real score or the amount of gain made in succeeding tests. These devices were successful in breaking up the tendency of our control sections to keep track of their score and so to interest themselves in their improvement as such, a tendency which tended to become stronger as our experiments proceeded and as the subjects of each section became more and more interested in both the experiment and in the fact of their improvement.

In this last experiment a separate stimulus sheet containing the entire list of problems was used for each test as in the other three experiments. These were placed face down on the table before the subjects. At a prearranged signal this sheet was turned over by the subject and the numbers constituting the first problem fixed in mind. As soon as these numbers were noted the sheet was promptly turned face down until the problem was mentally solved, when the answer was recorded in its proper place and the next problem learned; the process was repeated to the end of the practice, when the papers were taken up for the control group, and turned face down for the stimulus groups with the score made in the practice recorded on the back of the stimulus sheet. If in the process of thus solving a problem mentally a subject forgot one of the numbers or had not fixed the problem firmly enough in mind when the stimulus sheet was referred to the first time, he was directed to look at it promptly a second time.

Because of the nature of this fourth experiment and the special conditions imposed two factors became prominent in this type of acquisition. The test sheets contained many more problems than could be finished during the practice, even after considerable skill in this type of performance had been acquired. The subjects were therefore asked in each practice to

begin with the first problem and to proceed as far down the list as they could. This put a premium on the memory factors involved. Those who could retain and recall the answers to the problems which had been solved in previous practices could, of course, simply write down the correct answer in succeeding tests for all the problems that had been mentally solved in previous practices. This put a premium on accuracy and made the rate of gain relatively rapid in this experiment. To determine therefore the actual amount of gain which each subject and section made during the practice in developing the more *purely mental* functions involved in mentally multiplying one two-place number by another, we gave each section three extra trials, after the regular practice had been completed, using a list of new problems of the same degree of difficulty as those in the original list. The average scores made in these last three practices were then compared with the average scores made in the first three tests, to give us the absolute amount of gain made in the entire practice. In all other experiments the absolute and relative amount of gain made by each subject and section was determined by using their initial and final or highest score.

5. *Method Used To Interest the Subjects of the Stimulus Groups in the Fact and Possibility of Their Improvement*— Several devices were used to interest the members of our successive stimulus groups in the fact of their improvement, to arouse their "will to learn" and to establish in their minds a firm belief in the possibility of their continued advancement. The devices used were carefully planned and tried out before the regular experiments began and were given as directions to the group always in the same way. The following points were emphasized in this part of our directions:

(1) The members of all stimulus groups were required to count their score after each practice and to keep this score prominently before them while they worked as already indicated. This demonstrated the fact of their improvement or lack of improvement as the case might be.

(2) By other uniform directions given to the stimulus groups both before and during the practice we tried to make each subject believe that he really could increase his score from test to test. Members of these sections were frequently told that if they would only make up their minds to increase their score they would somehow find a way to do it. Our accurate method of measuring their output and having them keep track of their score usually convinced them that this was true. In the individual cases where such improvement did not occur, if brought to the experimenter's attention during the rest

interval between the practices, the individual was given personal assurance that he or she really could improve if only he made up his mind to do so. They were generally told to indicate by a mark at the beginning of the test, a point on their test sheet a short distance in advance of their best previous score and to say to themselves that they would reach it that practice.

(3) The members of the stimulus sections were also urged at the beginning of each practice period to do their best that trial, a direction which was, however, repeated in identical form to the control groups.

(4) The members of the stimulus sections were also asked at the beginning of each series of tests to study their scores and to be on the alert for anything that might occur during the practice to facilitate the learning or work and to utilize all such discoveries in future practices, avoiding just as carefully everything that tended to hinder them.

(5) At times the stimulus sections were also told that they really ought to make more improvement than they were making.

(6) At the beginning of the last third of the practice in each experiment the members of the section which had been the control group in the previous practices were given a record sheet showing the best score they had made in any of the previous practices and told they could surpass this record in almost every test, and urged to exceed this score as much as possible in each succeeding test. The control sections were, on the other hand, told at the beginning of the last third of the practice to pay no attention whatever to the score they were making or to their rate of improvement. They were asked so far as possible to banish all thought and desire for improvement as such from their minds, but were admonished at the beginning of each test, the same as the stimulus groups, to do their best on every test, and to make as high a score as possible.

6. *Special Advantage of the Method Used*—The device of thus alternating the conditions for our sections in each experiment, making each section first a control group and then subjecting these same individuals to the set of conditions whose influence we desired to determine, was used because we desired to measure the amount of influence exerted by this group of factors on the rate and amount of improvement made by the members of each section, and for each type of learning studied. Because of inequalities in the initial ability of the two groups to do the tasks that were to be learned, and of the different rates of improvement which these two groups

of individuals might naturally make, we desired to test the effect of the special group of incentives studied always on the same group and for each type of learning. To make either section a permanent control group would be open to grave objections, as the reader will readily see, while if we alternated the control groups in successive experiments we would still have a variable factor in the fact that the two groups might show a difference in initial ability and rate of improvement in the particular types of learning studied. Our method of making each section first a training and then a control group for each type of learning avoids all these difficulties, and enables us to study the effect of our special group of incentives upon both groups of individuals and for each type of learning selected.

III. Results

The record made by each subject in each practice of our four experiments was determined by counting the actual number of "a"s legibly written (experiment 1), the number of letters correctly located and crossed out (experiment 2), the number of correct substitutions made (experiment 3), and the number of problems correctly solved in each of the practices taken by our 124 subjects. In tabulating these results original data tables were made out for the individuals belonging to each section, the record for the men and the women being kept separate for study and comparison in each experiment. These original tables (four for each experiment) therefore contained the name of each subject and the score he made in each of the practices for each experiment; also the number of errors made in each practice. From the data contained in these original tables learning curves were constructed for each subject and a composite learning curve for all the men and all the women of each section showing the average record made in each practice and for each of the four experiments.

And since each individual and section was subjected during the first two-thirds of their practice, in each experiment, to the special group of incentives we studied and during the last third of the practice to the opposite set of conditions, or *vice versa* as the case might be, these curves picture the effect of the special set of incentives imposed in our experiments upon the rate and amount of gain made during the practice when these individuals or groups were thus subjected to each set of conditions. The absolute gain is shown by the direct increase in score. The relative gain made by each individual and section was determined by calculating from the data con-

tained in our original tables the per cent of improvement made during the period of practice when they were subjected to each set of conditions, and for the practice taken as a whole. The degree of conscientiousness or care with which the sections worked when serving as a stimulus or control group is indicated by the number of errors[11] made.

1. *Variations in Rate and Amount of Improvement Made by the Stimulus and Control Groups in the Various Experiments*—The amount of influence which interest in improvement and belief in its possibility exerted on the rate and amount of gain made during the practice in our several experiments is therefore shown (1) by comparing the absolute amount of gain made when the individuals and sections were being subjected to this special set of incentives during their practice (i. e., when they acted as a stimulus group) with the gain made by the same individuals or groups in the same type of learning when they were not thus stimulated by this group of incentives (i. e., when they served as a control group). (2) By comparing the relative amount of gain or per cent of improvement made by each individual or group when subjected to this set of incentives with the per cent of gain made by the same individuals or groups when they were not being thus interested in their improvement as such.

The results of these comparisons are striking and conclusive. The absolute amount of gain made by our several stimulus and control sections as well as the character of their improvement is shown in a series of practice or learning curves presented in Figs. 1 to 16. These curves indicate the absolute amount of improvement that was made by the men and women of each section in all of our experiments. The records for the men are indicated throughout by the heavy or unbroken lines, the records for the women by the dotted lines. Each curve represents the practice of a section which served both as a stimulus and a control group, it being an essential part of our method to use each section both as a stimulus and a control group, at different stages of the practice in each experiment. Whether a curve, or any part of it, indicates the result of practice by a stimulus or a control group is indicated in each figure.

The *relative* gain made by each section in our several ex-

[11]In determining the score made in experiment 1 only the "a"s were counted that were legibly written, the subjects being told when the practice began that they would be thus marked. No mistakes could therefore occur in this experiment. In the other three experiments the number of errors made in each practice were ascertained and deducted from the total score made in the practice and studied in relation to the rate and amount of improvement made.

periments is shown in Table II, which gives the per cent of improvement made by each section, men and women taken separately, while serving both as a stimulus and a control group. The per cent of gain made by the stimulus sections is written in black-faced type to make it easily distinguishable from the gains made by the various control groups.

(a) *Absolute and Relative Amount of Gain Made by Each Stimulus and Control Section in the Several Experiments*—A mere glance at the data presented in these various figures and in Table II will show (1) that the stimulus sections in all our experiments make more rapid and continuous gains than do the members of our control groups; (2) that each section or group of individuals when they are being interested in the fact of their improvement as such make rapid and continuous gain, and cease suddenly to improve when subjected to the opposite set of conditions; and (3) that a section which has not been thus subjected to this special group of incentives during the first two-thirds of their practice, if definitely interested in the possibility and fact of their improvement at the beginning of the last third of their practice, will suddenly begin to make rapid gains in their output which then proceeds rapidly and continuously to the end of the practice (compare Figs. 1 to 4).

Taking as an example the record made in experiment 1 it will be seen that both the men and the women belonging to Section II improved much more rapidly and continuously during the first 10 tests (50 practices), when they were being specially interested in their improvement as such, than did the members of Section I who served as a control group during these practices (compare Figs. 1 and 2 and the curves for the men and the women of Sections I and II in Figs. 3 and 4). But at the fifty-first practice or eleventh test, when the conditions were reversed for the two sections, the combined curve for all members of Section I, who were now being specially interested in their improvement, makes a very decided upward bound and continues to rise rapidly for the rest of the practices (see Fig. 1), while the curves for both the men and the women belonging to Section II, who were now prevented from interesting themselves in their improvement, show a sudden decline at this point (see Fig. 2). And while they rose slightly after the fifty-first trial, no real gain was made during the rest of the practices. They were still far below the highest point attained in the first fifty trials when the practice ended. These facts are strikingly shown by Figs. 3 and 4, which bring together for the sake of ready comparison the record made by the men and women belonging to these sections, enabling one to compare directly for the same periods of prac-

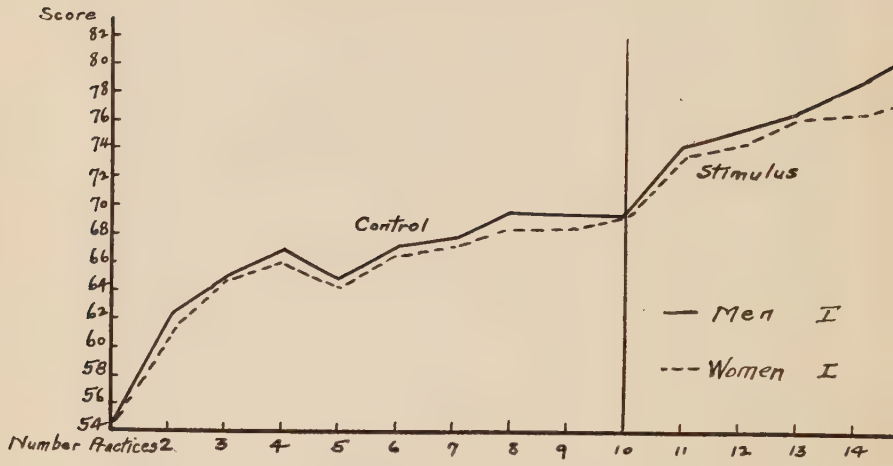

FIG. 1. LEARNING CURVES FOR MEN AND WOMEN OF SECTION I IN EXPERIMENT I

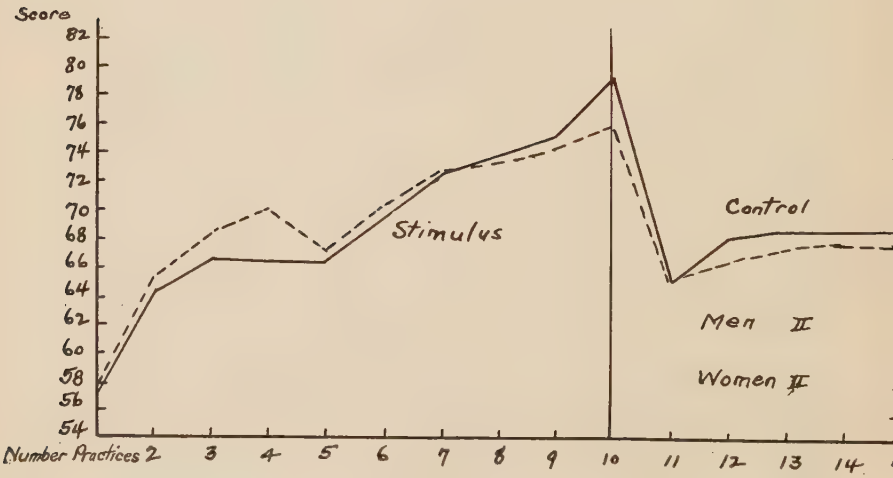

FIG. 2. LEARNING CURVES FOR MEN AND WOMEN OF SECTION II IN EXPERIMENT I

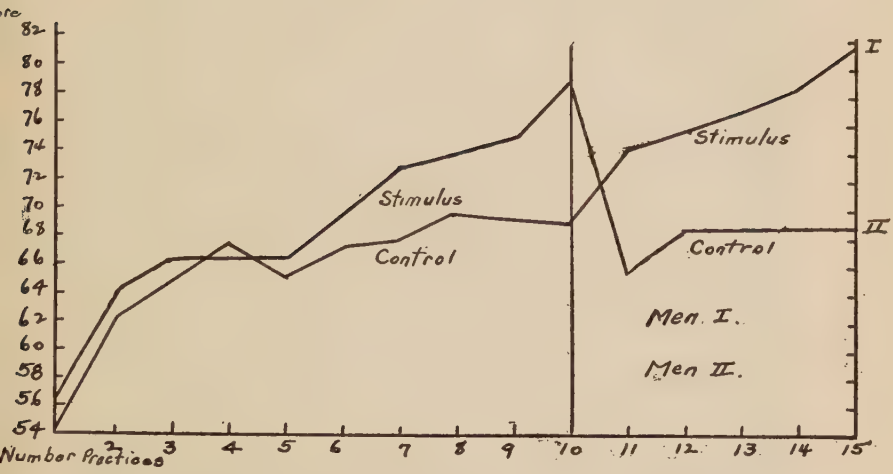

FIG. 3. LEARNING CURVES FOR MEN OF SECTIONS I AND II IN EXPERIMENT I

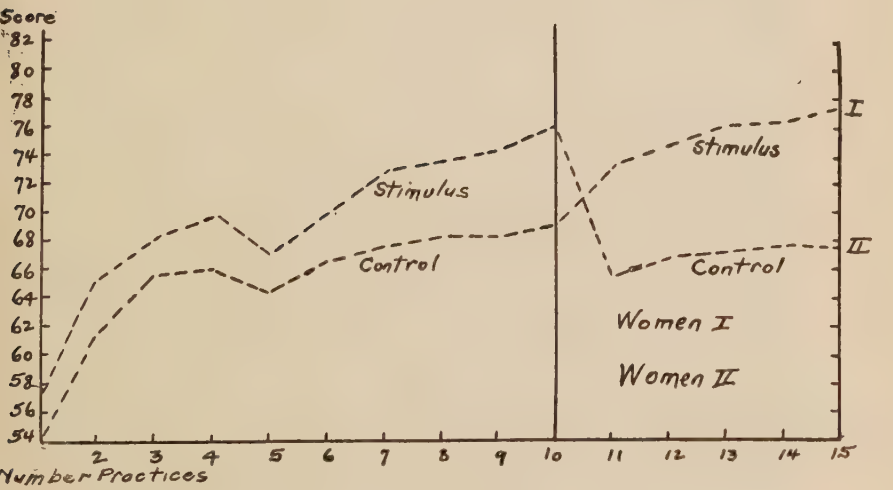

FIG. 4. LEARNING CURVES FOR WOMEN OF SECTIONS I AND II IN EXPERIMENT I

tice the record made by the section which was being subjected to our special group of incentives with the record made by the section which was not.

Moreover, what is true for the groups taken as a whole is true for *all* the individuals composing it. That is to say, the individual learning curves follow exactly the same course as the composite or group curve, showing that each individual in the stimulus section was helped somehow by a knowledge of his score and by the interest and confidence which we aroused in his ability to improve. When these specially arranged incentives, designed to arouse their "will to learn," were removed and transferred to the members of the control section a reverse result was obtained for the men and women of both sections. That is to say, every subject belonging to a stimulus group, where he was being specially interested in his rate of gain, made a rapid and continuous improvement throughout the practice, but when he became a member of a control group his curve showed a much less rapid rise (first two-thirds of practice) or a sudden drop (last third of the practice) as the case might be. To be more explicit, *every* man or woman in experiment 1 belonging to Section II, our stimulus group, made very rapid and continuous improvement during the first 50 practices, but in each of the last 25 practices his record fell below his or her best previous score, and conversely for Section I, the control group in this experiment. Each man and woman belonging to the latter section made a marked and continuous gain in the last 25 practices over and above the best record made during the first 50 practices. (See Figs. 1 and 2.)

And what is true for their absolute gain holds true for the relative gains made by the various stimulus and control sections (see Table II). That is to say, the individuals in experiment 1 who were subjected to our special group of incentives made a higher percentage of gain during that period of practice than did those who were not. The combined results are shown in Table II, which gives the percentage of gain made by the men and women belonging to each of our original sections when they practised as members of both a stimulus and a control group in each experiment. In every experiment save one do the members of the stimulus sections show both a greater percentage of improvement and a greater absolute gain than do these same individuals when they are members of a control group. The only exception occurred in the third experiment where Section I, the control group, made practically as much relative gain in the first 30 practices as did the members of Section II which served as the stimulus group (see

Table II). The learning curves for this experiment show the same tendency (see Figs. 10 to 14). For the first 30 practices in this experiment the learning curves for the control group rose about as rapidly as did the curves for the stimulus group. The curve for the control group in the last third of the practice also continued to rise somewhat in this experiment, but the curve for the stimulus group (Section I) now shows a sudden rapid rise which continues during the rest of the practice, showing the marked and continuous effect of our special group of incentives on the rate and amount of improvement made by this stimulus group. As will be recalled, it was in this experiment that we failed to control completely our conditions for the control groups as has already been pointed out in the section on Method (see section II, page 314 above).

This seeming exception to the general rule is explained by the supplementary data obtained from our learners in this experiment which showed that 80 per cent of the subjects in our control groups were definitely interested in their improvement as such and had kept some track of their progress, while many members of the stimulus groups were perversely stimulated by our set of directions during these same practices. The answers to our special questions given in writing at the close of the experiment showed further that the intense desire to excel each previous record, which we instilled in our stimulus groups, made many members push themselves along more rapidly than they could go during this practice, while in the last third of the practice when they were supposed not to be interested in their improvement at all, about three-fourths of them stated that they were definitely keeping track of the gains they were making, many adding that they had observed that they not only were locating the point on the test sheet which they had attained in the previous practice, but had repeatedly noted that they were actually trying to surpass that point in succeeding practices, contrary to the directions given them as members of the control group. This partial exception to the general results obtained in all the other experiments therefore becomes not so much an exception to the rule but additional evidence of the positive and helpful effect of the group of incentives which we isolated for study in these experiments.

The results of our first experiment are therefore typical of all the rest. Notwithstanding the fact that the complexity of the learning process increased in our later experiments and the fact that the knowledge gained in previous experiments while serving as a stimulus group made it increasingly more difficult to keep our control sections from keeping track of their scores

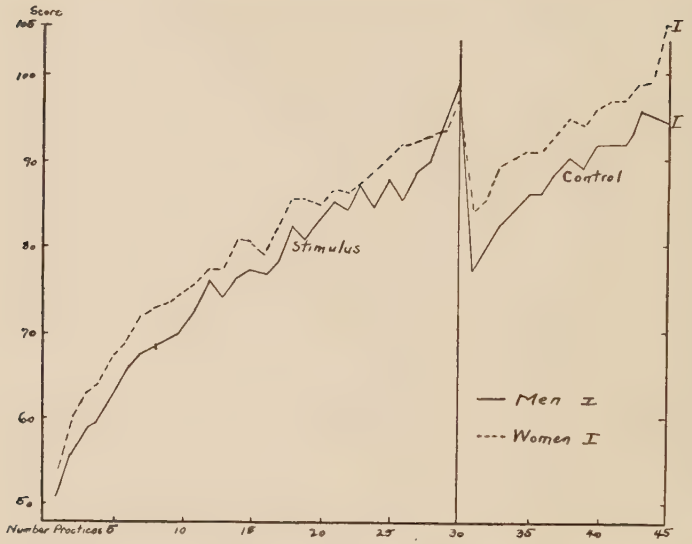

FIG. 5. LEARNING CURVES FOR MEN AND WOMEN OF SECTION I IN EXPERIMENT 2

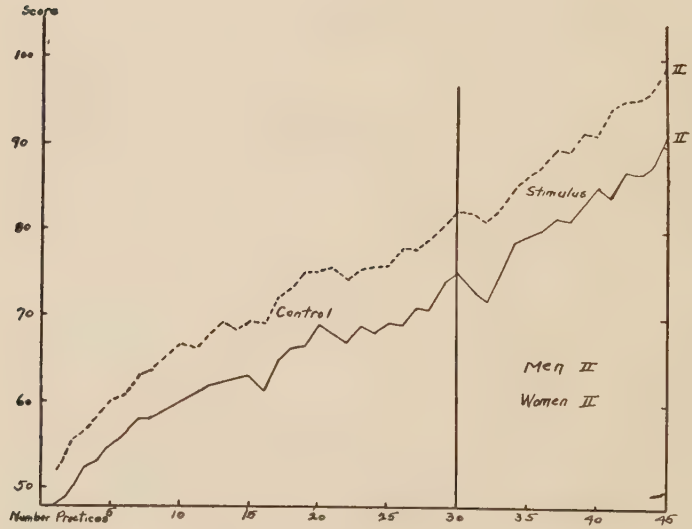

FIG. 6. LEARNING CURVES FOR MEN AND WOMEN OF SECTION II IN EXPERIMENT 2

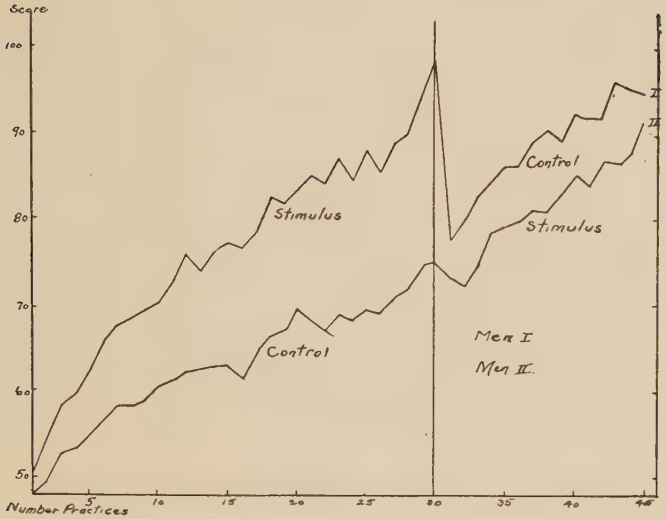

FIG. 7. LEARNING CURVES FOR MEN OF SECTIONS I AND II IN EXPERIMENT 2

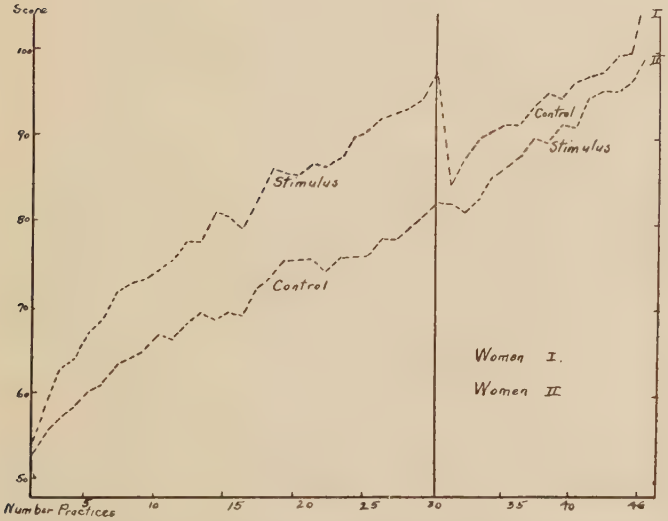

FIG. 8. LEARNING CURVES FOR WOMEN OF SECTIONS I AND II IN EXPERIMENT 2

and from remaining interested in the fact of their improvement while acting as a control group, the curves for all our experiments, particularly the second and fourth, show the same marked tendencies revealed by the curves for experiment 1. Every man and every woman in Section I of experiment 2, the stimulus group, made marked improvement in the first 30 tests. Many individuals more than doubled their initial score, while every man and every woman in Section II, now the control group, made proportionally less gain in the first 30 tests than did those belonging to our stimulus group. For the last 15 tests every man and all but two women belonging to Section II, now the stimulus group, made a decided gain over their best previous score, while Section I, as a whole and practically every man in it, lost ground during the last 15 tests. Some of the individuals in the section increased their score during the last 15 tests as much as 40 per cent (compare Figs. 5 to 8).

TABLE II. PER CENT OF IMPROVEMENT OR RELATIVE GAIN MADE BY STIMULUS AND CONTROL SECTIONS COMPARED

Experiment	*Groups*	*First two-thirds of practice*		*Last third of practice*[12]		*Total Gain %*		*Cases*	
		Men	*Women*	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*
1	Section I	27.93	27.62	**15.67**	**12.03**	46.82	42.27	19	54
	" II	**35.38**	**33.34**	-12.18	-15.80	35.38	33.34	19	28
2	Section I	**93.53**	**80.65**	- 3.05	6.35	93.31	92.65	20	52
	" II	57.06	55.94	**21.88**	**20.10**	91.43	87.30	18	28
3	Section I	81.91	64.24	**38.77**	**40.02**	149.37	130.00	19	51
	" II	**73.24**	**74.56**	27.41	17.44	120.73	105.01	18	27
4	Section I	**434.07**	**498.26**	15.23	1.07	515.40	504.76	20	52
	" II	362.03	457.69	**28.91**	**19.83**	495.61	568.30	18	26

The relative amount of gain made by the stimulus and the control group in this second experiment is shown in Table II. From the data contained in this table it will be seen that Section I, which was exposed to our group of incentives for the first 30 tests, made a greater percentage of total gain for the entire practice than did Section II, which was exposed to this group of stimuli for only the last 15 practices. This same tendency was shown in experiment 4. The more rapid improvement of our stimulus groups over the gain made by the control group is shown in Figs. 7 and 8 by the spreading of the learning curves in the first two-thirds of the practice.

The composite curves (Figs. 13 to 16) for experiment 4 show in addition to the above results that the women belonging to Section I improved more rapidly during the first 30 tests,

[12]Gain over highest record made in the first two-thirds of the practice.

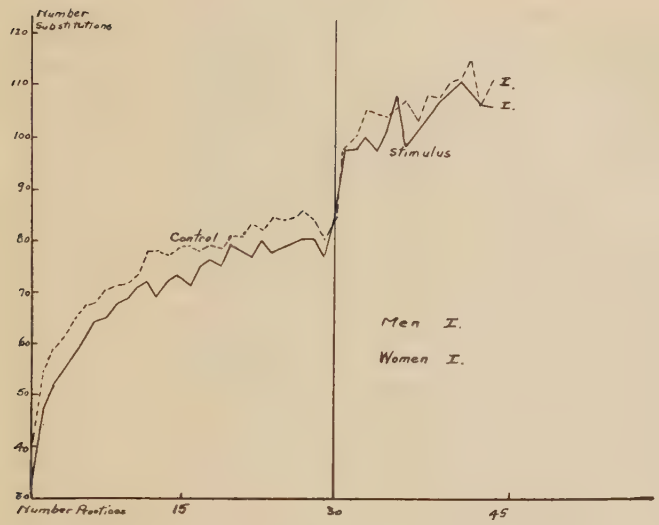

FIG. 9. LEARNING CURVES FOR MEN AND WOMEN OF SECTION I IN EXPERIMENT 3

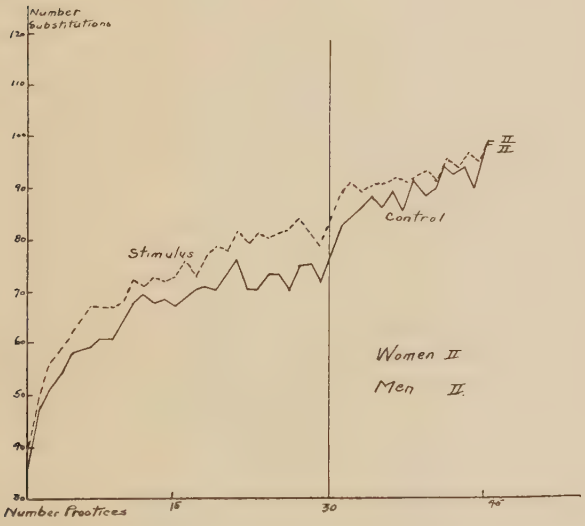

FIG. 10. LEARNING CURVES FOR MEN AND WOMEN OF SECTION II IN EXPERIMENT 3

when they were being specially interested in the fact of their improvement, than did the men under the same conditions. During the last 15 practices when they were kept ignorant of their score they made little improvement, 72 per cent of them failing even to reach the point of efficiency which they had attained at the close of the first 30 practices.

The men and women of Section II, on the other hand, improved more slowly during the first 30 tests, when they were not being specially interested in their improvement as such, than did the subjects of Section I, whom we tried especially to interest in the gains they were making and in the possibility of improvement. This is shown by the fact that the curves for both the men and the women belonging to this section pass below the curves for the stimulus group (Section I) for all the first 30 practices. But when the members of this group were informed at the beginning of the last 15 practices of their best previous score and urged to interest themselves in their improvement as such, their curves, which during all the 30 previous practices passed below the curve for the members of Section I, now rise rapidly above it, and remain so for the rest of the practice, reaching a point in the final practice above the best record made by members of Section I, and far above the best record made by the same section during their previous practices (see Fig. 15). The men of the control group in these last 15 practices, when taken as a whole, made a slight gain over the best record attained in the first 30 practices; the women fall much below it (compare Fig. 16).

And what is true in these experiments for the composite curves representing the average score of the sections taken as a whole is true for the individual learning curves also; 83 per cent of the men and 84 per cent of the women belonging to the control section in experiment 2 raised their scores very materially during the last 15 practices over and above the best score made in any of the previous 30 tests. For the sections which served first as a stimulus group the situation is just the reverse; 72 per cent of the women belonging to Section I failed during these last 15 practices even to reach the highest score made during the first 30 practices. And while the majority of the men (60 per cent) belonging to Section I made a slightly higher score during these last 15 practices than their best score in the first 30 tests, the group taken as a whole did not improve their score during this period of practice as much as did the men of the stimulus group.

The reason for this gain on the part of the men in the control group was revealed by their answers to the questions asked at the close of the experiment, which indicated the ex-

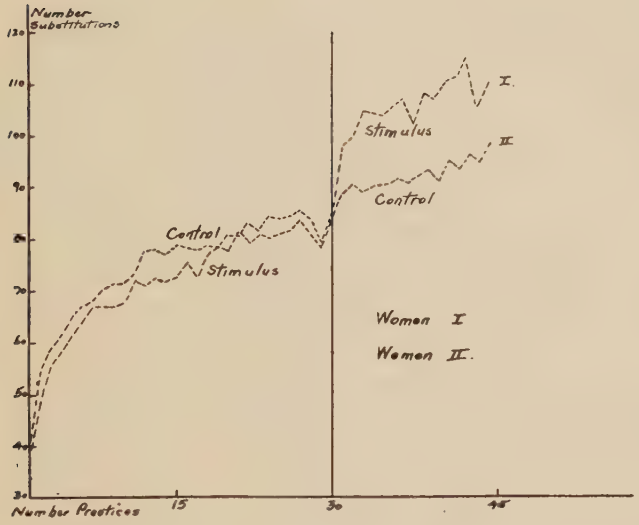

FIG. 11. LEARNING CURVES FOR WOMEN OF SECTIONS I AND II IN EXPERIMENT 3

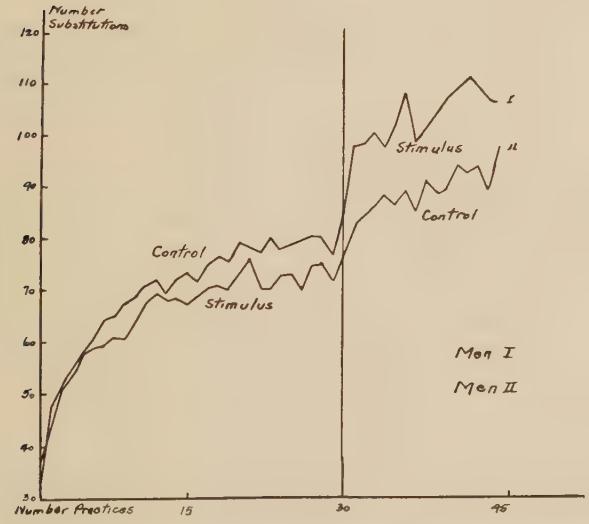

FIG. 12. LEARNING CURVES FOR MEN OF SECTIONS I AND II IN EXPERIMENT 3

tent to which they had succeeded in following the directions given them as members of the control group. A tabulation of their answers to these questions showed that 82 per cent of the men belonging to the control section stated that they could not help but be interested during these last 15 practices in the improvement they were making, while 75 per cent of the women stated that they had succeeded in banishing all thought of improvement from their minds during these last 15 practices.

The outstanding facts of the above comparison of the amount of improvement made by our several stimulus and control groups in the four types of learning studied are therefore the following:

1. The stimulus sections make more improvement with a given amount of practice than do the control groups. This is true for the groups taken as a whole, and for the individual records taken separately.

2. A stimulus group which has been making rapid and continuous improvement ceases suddenly to show such gains when our special group of incentives are removed.

3. A control group, on the other hand, which has been making little or no progress in the practice begins suddenly to improve and continues to gain more rapidly and consistently when definitely interested in its improvement as such and is made to feel that further improvement is possible.

4. It is significant also that these results hold not merely for the sections taken as a whole but for the men and women taken separately and for the record made by the individual subjects belonging to the various stimulus and control sections in the different experiments, and holds true for both the absolute and the relative amount of gain made in each type of acquisition studied.

5. It is further significant that the records of the stimulus sections contained fewer mistakes than did the records of the control sections, showing that the same groups of individuals not only ceased to gain in their score but also became more careless about their work when not interested in their improvement as such. But when they were subjected to the special group of incentives arranged in these experiments they began at once to increase both their output and their accuracy, as will be pointed out below.

(b) *Character and Rate of Improvement Made by the Various Stimulus and Control Groups*—1. With but two exceptions therefore the learning curves for all 16 stimulus groups rose more rapidly than did the curves for the corresponding control sections. This is shown by the spreading of the curves for

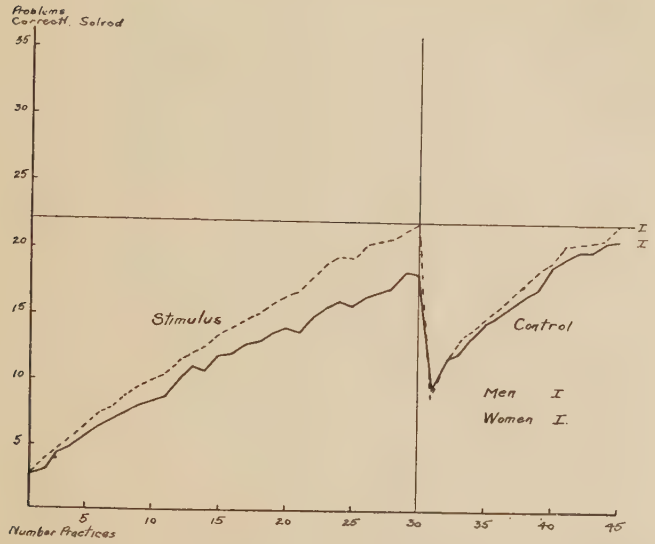

FIG. 13. LEARNING CURVES FOR MEN AND WOMEN OF SECTION I IN EXPERIMENT 4

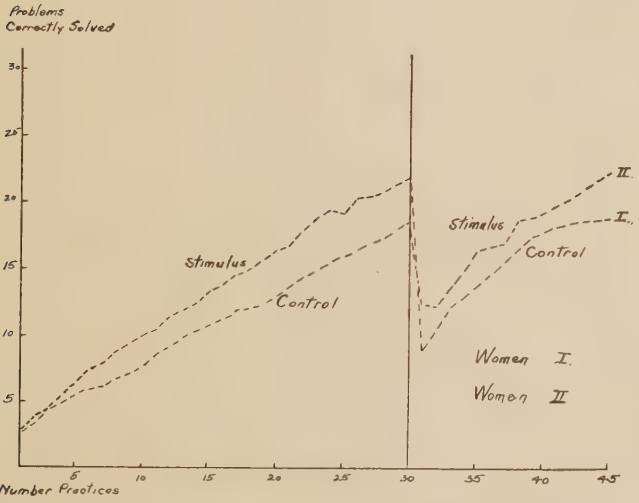

FIG. 14. LEARNING CURVES FOR MEN AND WOMEN OF SECTION II IN EXPERIMENT 4

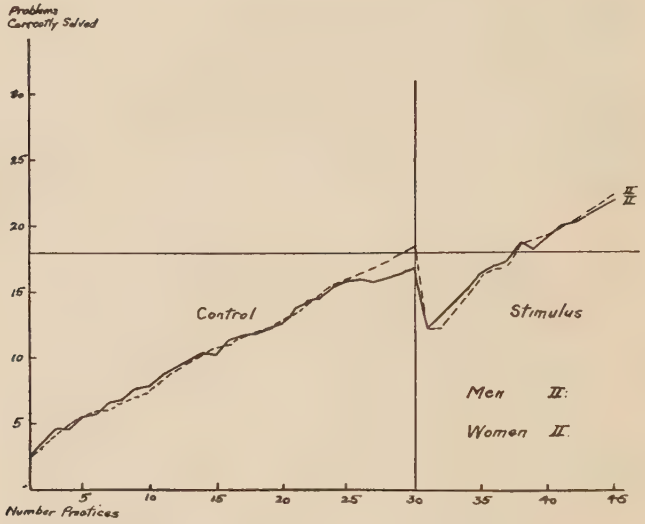

FIG. 15. LEARNING CURVES FOR MEN OF SECTIONS I AND II IN EXPERIMENT 4

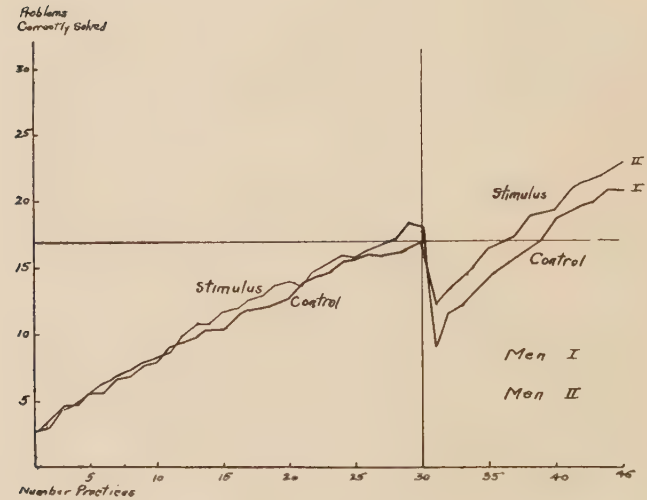

FIG. 16. LEARNING CURVES FOR WOMEN OF SECTIONS I AND II IN EXPERIMENT 4

the two groups as the practice proceeds and approaches the end of the tests (see especially Figs. 3 and 4, and 7 and 8). The exceptions come for the men of Section I in experiment 4 and for the women of Section II in experiment 3, and are explained by the fact that more than three-fourths of the subjects belonging to these sections stated that they were not able to follow the directions in their practice but remained interested in their improvement as such while practising as a control group.

2. There is also evidence in our results which shows that the majority of the subjects whose "will to learn" was especially appealed to were influenced in a definite way by the approaching end of the practice period. Figure 15 shows that the subjects of Section II whose desire for improvement was particularly appealed to during the last 15 practices made their highest record in the last three tests, while the women show a slump in effort and proficiency, for these practices. The same thing is true for the men of Section II in experiment 1 (see Figs. 2 and 3), who show a similar tendency as the end of the first 30 practices is approached. Here the curve for the section whose "will to learn" was being appealed to shows a sudden rise while the curve for the section which was kept ignorant of their score and asked to ignore their rate of improvement fails to rise in the last 4 or 5 practices.

In other words, the rate of gain is very materially increased for most of the stimulus groups in the last 3 or 4 practices. The control sections, on the other hand, do not seem to be influenced so much or at all by the approaching end of the practice. There is one marked exception to this rule, namely, the women belonging to the control section in experiment 2 (see Figs. 5 and 8). The men seem to be stimulated more by the approaching end of the practice than are the women.

3. The slump in the curves at the fifth test in experiment 1, for the men and women of both sections, is due to the fact that only 4 tests (20 practices) were given in this experiment during the first day of practice, 6 tests (30 practices) the second day, and 5 tests (25 practices) the last day (compare Figs. 1 and 2). The low record for the fifth test is therefore due to the fact that three days had intervened between the fourth and the fifth tests and that no warming-up practice was given for reviving the associations which had been but slightly formed in the previous practices, as was done in the three later experiments.

4. Another fact of interest, and one which throws much light on both the permanency and the character of the improvement made, is the fact that the stimulus sections made

on the whole fewer mistakes in their practice than did the members of our various control groups. No directions were given to the learners in regard to the attitude which they should assume towards mistakes except that they were given the general instruction to make their records correct and to work as fast as they could in each practice and test. That the stimulus groups not only improved more rapidly as a result of the practice but actually made fewer mistakes is an important result, for it made the progress more sure as well as more rapid, thereby showing an additional effect of the special group of incentives which we isolated for study in our experiments.

The average number of errors made per test by the various sections in each experiment and division of the practice is shown in Table III. The records for the stimulus groups are set in bold-faced type to make them more easily distinguishable from the average number of mistakes made by the control groups. No mistakes were counted in the first experiment, as already pointed out above.

TABLE III. AVERAGE NUMBER OF MISTAKES MADE BY EACH SUBJECT IN EACH TRIAL WHEN PRACTISING WITH A STIMULUS OR CONTROL GROUP

Experiment	*Section*	*Record for first two-thirds of practice*		*Record for last third of practice*	
		Men	*Women*	*Men*	*Women*
2	I	**1.93**	**1.04**	1.74	1.07
	II	.89	1.59	**.86**	**1.02**
3	I	.308	.103	**.237**	**.224**
	II	**.111**	**.120**	.144	.214
4	I	**2.33**	**2.32**	2.52	2.67
	II	2.25	2.86	2.24	2.43

5. But a fact of even greater significance than the decline in the number of mistakes is the fact that the individuals belonging to the various stimulus sections who possessed the highest initial ability (as indicated by their scores on the first test, or average score on the first three practices) show, on the whole, the greatest amount of improvement in the practice, while in the control sections these more capable individuals do not show this extra amount of gain. That is to say, the individuals who possess the highest initial ability of the type practised in any given experiment improve relatively more when they are being specially interested in their improvement than they do when practising as members of a control section. In other words, when a group of individuals are subjected to the special group of incentives arranged for our experiments

TABLE IV. SHOWING AVERAGE GAIN IN ABSOLUTE POINTS MADE BY MEN AND WOMEN WITH HIGHEST AND LOWEST INITIAL SCORE

EXPERIMENT I

	Section I				*Section II*			
Percentile Groups	*Highest 25*	*High 50*	*Low 50*	*Lowest 25*	*Highest 25*	*High 50*	*Low 50*	*Lowest 25*
Men								
First 50 Practices	68.5	85.2 (76.8)	74.6	106.5 (90.5)	**113.0**	**93.25** (103.1)	**98.5**	**104.75** (101.6)
Last 25 Practices	**31.5**	**39.8** (35.6)	**65.8**	**74.0** (69.9)	-38.0	-34.5 (-36.2)	-24.0	-31.0 (-27.5)
Total Gain	100.0	123.6 (111.8)	140.4	180.2 (160.3)	113.0	93.0 (103)	98.0	105.0 (101)
Women								
First 50 Practices	76.7	78.1 (77.4)	94.0	81.0 (87.5)	**85.6**	**108.0** (96.8)	**101.0**	**94.4** (97.7)
Last 25 Practices	**39.6**	**43.0** (41.3)	**44.5**	**38.2** (41.8)	42.0	48.0 (45.0)	26.0	24.0 (25.0)
Total Gain	116.3	121.0 (118.6)	138.4	112.3 (125.3)	86.0	108.0 (97.)	101.0	94.0 (97.)

EXPERIMENT II

Men								
First 50 Practices	**50.6**	**49.4** (50)	**53.8**	**28.4** (46.1)	27.0	29.0 (28)	31.0	30.4 (30.5)
Last 25 Practices	-2.6	-1.2 (-1.9)	-.04	0.0 (-.02)	**16.75**	**11.2** (13.97)	**19.8**	**15.5** (17.75)
Total Gain	54.2	51.2 (52.7)	57.6	44.2 (50.9)	43.75	40.2 (41.8)	50.8	45.5 (48.2)
Women								
First 30 Practices	**46.5**	**46.1** (46.2)	**47.8**	**44.1** (45.9)	34.9	36.3 (35.6)	31.1	25.3 (28.2)
Last 15 Practices	7.1	5.8	11.1	4.1	**13.0**	**18.2** (15.6)	**13.7**	**19.8** (16.7)
Total Gain	53.6	53.0 (53.3)	61.2	50.0 (55.4)	47.86	54.6 (51.23)	45.3	45.0 (45.1)

EXPERIMENT III

Men								
First 30 Practices	54.7	49.4 (52.2)	52.4	59.7 (56.0)	**44.0**	**47.0** (45.5)	**40.0**	**48.0** (44.)
Last 15 Practices	**27.5**	**27.0** (27.2)	**21.2**	**32.8** (27.0)	16.6	20.2 (18.4)	19.0	14.6 (16.8)
Total Gain	82.2	76.4 (79.3)	73.6	92.5 (83.0)	60.6	67.2 (63.9)	59.0	62.8 (60.9)
Women								
First 30 Practices	46.5	46.0 (46.2)	48.1	51.0 (49.5)	**46.4**	**58.0** (52.2)	**49.2**	**49.7** (49.4)
Last 15 Practices	**26.0**	**32.0** (29)	**26.7**	**21.4** (24.1)	15.9	11.4 (13.5)	16.6	9.8 (13.2)
Total Gain	72.2	77.9 (75.0)	74.7	72.4 (73.5)	62.0	68.8 (65.4)	64.3	59.5 (62.9)

the brightest individuals in that line to begin with show the most relative gain. But when the same group of individuals are subjected to the opposite set of conditions the individuals who possess the lowest initial ability show on the whole the greatest amount of gain. There are only a few exceptions to this general rule, as may be seen by an examination of the data contained in Table IV. The total gain made by the various percentile groups in experiment 4 figured by a different method shows the same thing (compare figures given in Table V).

This per cent of gain for the members of our several stimulus and control groups was figured in two ways. For experiments 1, 2 and 3 the relative gain made by the several percentile groups was determined by ascertaining the per cent of improvement which these various groups of individuals made in each experiment and comparing the relative gain made when they served as a stimulus group with the record made by corresponding percentile groups in the control sections. For experiment 4 the gain made by the various groups for the entire practice was figured as follows: Each of our 124 subjects was given at the close of the 45 practices an entirely new group of problems of the same degree of difficulty as the problems used in the regular experiment. Three extra practices were then given with this new material, under the same conditions maintained in the regular practice, save that both sections in these final practices were required to keep track of their score. The average score made in the first three tests of the regular experiment was then computed for each subject and compared with the average score made on these final three tests. It was believed that this would give a clearer indication of the actual amount of improvement that each subject had made in his ability to deal with the purely mental processes involved (i. e., imaging the numbers, holding them in mind until the necessary combinations could be made for final record) than the method of determining the total relative gain used for experiments 1, 2 and 3.

In this manner the average score made by each subject in the first three practices and the average score made in the three special practices given at the end of the experiment were compared and the absolute amount of gain, in problems correctly solved, determined for each individual and section. These individual scores were then arranged beginning with the subject which made the lowest initial score to the case making the highest initial score and placing opposite each name and average initial score the average number of problems correctly solved by the subject in the last three special practices. The

average gain was then computed for the various percentile groups of men and women belonging to each section. These results are presented in Table V and show that the individuals of every section save one who made the lowest initial score in this type of learning showed also the least amount of absolute gain in their practice, while the individuals, on the contrary, who made the best initial score in this experiment made the greatest amount of improvement in the practice. The one exception is the girls of Section II. It is also worthy of special mention that both the men and the women of Section I who were subjected to our special group of incentives for two-thirds of their practice, i. e., who served as our main stimulus group, showed the highest increase in improvement for the more capable individuals belonging to the section, that is, for the seventy-five percentile group.

TABLE V. ABSOLUTE GAIN MADE BY DIFFERENT PERCENTILE GROUPS IN ENTIRE PRACTICE OF FOURTH EXPERIMENT

Average improvement made by	*Lowest 25 percentile*	*Next 25 percentile*	*75 per-centile*	*Highest 25 percentile*
Section II—Men	2.14	3.14	4.52	4.46
Section II—Women	4.09	2.63	3.88	3.99
Section I—Men	3.30	3.26	3.50	5.56
Section I—Women	3.15	3.17	4.17	4.74

6. This method of calculating the total amount of absolute gain revealed still another probable effect of the special conditions arranged for the learners in this fourth experiment, namely: both the men and the women belonging to Section I who were thus stimulated during the first 30 tests made more total relative gain in the group of mental functions involved in mentally multiplying one two-place number by another than did the men and women belonging to Section II, who were subjected to this group of incentives for only the last 15 practices. This is true for the men and women taken together or separately, as is shown in the following table giving the per cent of gain made in the entire practice by the members of Sections I and II in experiment 4.

Groups	*Section I*	*Section II*
Men	111.5%	105.6%
Women	110.1	106.4

7. The amount of gain made during these 45 practices is also significant. As the table shows, the members of each section and sex group more than doubled, on the average, their initial ability to deal successfully with the mental problems presented in this type of learning. That those whose "will to learn" had been especially appealed to during two-

thirds of the total practice should increase their total efficiency in this line more than those who were exposed to this group of incentives for only one-third of their total practice is significant especially when taken in conjunction with the results already presented in Figs. 1 to 16.[13]

(c) *Individual and Sex Differences*—As was shown in section (a) above, most of the individual curves follow, in each type of learning, the same general course as the composite curves for the various stimulus and control groups taken as a whole. Some marked and important individual differences were found, however, not merely in *initial ability* of the type called for by our several experiments and in the *amount* and *character of the improvement* that was made as a result of the practice, but also in the way in which different individuals reacted to the group of special incentives that were arranged in the several experiments.

(1) *Individual Differences Shown*—Some idea in regard to the range in initial ability and the variations in the absolute amount of improvement made by different individuals in each of our sections and sex groups may be obtained from the data given in Table VI, which shows the total range in initial and final score for these several groups in experiments 1, 2 and 3. About the same range in ability was shown in experiment 4 and by the relative improvement that was made in each experiment. The latter was worked out for three of our experiments, but as it showed no new facts was not determined for the fourth or included in the table. The table shows a greater range in both initial ability and in improvement for the girls than for the boys.

Table VI. Individual Differences
Range of Variations Shown at Beginning, End and at Various Stages of Practice

	Variations in initial score		*Gain in first 30 tests*		*Highest score made in practice*		*Gain in last 15 tests*		*Total or absolute gain*	
	Men	*Women*	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*
Experiment I										
Sect. I										
Lowest	235	206	52	39	360	280	**5**	**12**	72	60
Median	277	272	72	87	411	402	**54**	**41**	154	118
Highest	321	333	159	140	444	487	**101**	**98**	201	217

[13]This result, obtained also in experiment 2, was not obtained in experiments 1 and 3, where Section II was subjected to our special group of incentives for the first two-thirds of the practice. It may, therefore, be due not to the influence of the "will to learn" but to a greater capacity to improve by practice on the part of the members of Section I over the learning ability of the members belonging to Section II.

Sect. II										
Lowest	209	229	**71**	**62**	311	318	-11	-7	71	62
Median	274	289	**89**	**96**	371	375	-30	-38	89	96
Highest	362	345	**160**	**162**	482	452	-67	-87	160	162
Experiment 2										
Sect. I										
Lowest	39	42	**27**	**25**	74	83	-15	-34	30	28
Median	48	51	**46**	**48**	100	102	-2	5	54	55
Highest	92	92	**70**	**75**	132	149	19	41	72	100
Sect. II										
Lowest	33	40	11	14	70	75	**11**	**7**	20	26
Median	47	50	30	30	93	92	**18**	**16**	47	48
Highest	72	87	43	55	120	140	**26**	**41**	64	80
Experiment 3										
Sect. I										
Lowest	28	25	30	22	87	83	**6**	**8**	49	39
Median	35	44	55	51	114	115	**27**	**25**	83	71
Highest	47	56	77	73	162	166	**40**	**44**	117	110
Sect. II										
Lowest	24	18	**25**	**20**	67	65	-1	0	32	35
Median	35	40	**46**	**49**	100	102	17	14	65	63
Highest	60	60	**67**	**80**	129	141	35	25	89	101

In regard to variations in the degree of susceptibility which different individuals showed to the special incentives arranged for the various stimulus groups the following facts should be emphasized:

1. All of our subjects seemed to be intensely interested in all the experiments. But the record and behavior of some individuals in the practice seemed very erratic and unstable, while the record of others showed a steady increase in score, some rapid, others a steady but slower gain.

2. Some individual records and curves give evidence of being influenced very decidedly, consistently and successfully by the group of incentives used upon our stimulus groups. Others were not influenced much, if at all, by these incentives. They could not be made interested in their improvement as such and took the tests more as a matter of course. In certain experiments some individuals were even influenced adversely by the directions which we gave them and by the intense interest which was awakened in their improvement and score. This was particularly true for many individuals in the stimulus sections of experiment 3. In fact in all of the last 3 experiments some subjects became for a part or all of the practice so much interested in the fact or desire for improvement that they focussed their attention *on the improvement as such* instead of on the details of the task which was to be performed or on the *means* required to bring about

the desired improvement. As a result their record in particular practices and their total improvement was interfered with. In other words, by trying to go too fast they lost control over their work and the *means* of improvement for a part or all of the practice. A few individuals in both sections seemed so unstable in their nervous make-up that no incentive we were able to give them would continue to operate steadily for more than a few practices at a time, while others seemed to be permanently influenced or set as it were in the right direction for the entire practice by this same set of directions and incentives.

These facts, and others too carelessly observed in the course of our experiments to be tabulated and reported, throw much light on the nature of the learning processes involved in our several experiments and upon the question of proper incentives in learning. The results obtained in the more complicated types of acquisition involved in experiments 3 and 4 show, among other things, that many individual students need in addition to having their interest aroused in their own improvement and in its possibility, to be shown exactly how to proceed to make such gains. That is to say, they must be shown exactly what to do or be given the kind of help which will enable them to direct their energies in a way that will make their practice more successful and efficient. This much is certain, the mere determination to improve and the belief that such improvement is possible must be accompanied by a determination to find the right means of bringing it about. The brighter subjects discovered these ways for themselves when subjected to the proper incentives and when they were confronted by the problem. But for other individuals the group of special incentives arranged in our experiments were not sufficient to insure such gains. Our special group of incentives were only effective when they succeeded in arousing a genuine interest in improvement, which later led the subject to discover for himself the improved methods of reacting to the concrete situations which the learning presented. A careful study of the individual records and errors made in our experiments, when considered in relation to our total results, indicate very clearly that, as the learning in our experiments became more complex, the special group of factors studied in our experiments could not be relied upon implicitly to bring about the desired improvement in all individual cases because some individuals were not influenced so much by these special factors as others and many gave unmistakable evidence of the fact that they needed additional help in the more complicated types of learning to make the

right adaptations, and so to make their improvement continuous.

3. Some individuals got so interested in their rate of improvement during the stimulus practices that they carried over the interest and enthusiasm gained in these tests to the control practice and there kept track of their score in every way they possibly could, contrary to the directions given them as members of a control group. The evidence for this statement was contained in their individual curves which, contrary to the general rule, continued to rise rapidly and continuously during these control practices; also by the fact that their results improved in accuracy while the large majority of their classmates were dropping behind in both their score and its accuracy. That this was the case is further shown by the special data which we obtained from each subject at the close of the last two experiments. In practically every such case the answers to the questions given at the close of the last two experiments revealed the fact that these individuals had kept track of their score and had remained interested in their improvement as such during these practices. In the first experiment where conditions were perfectly controlled for our control sections and where none of our subjects knew all the conditions of our experiments not a single individual in the control groups made any gain during the last third of the practice and only a slight gain during the first two-thirds of the practice.

(2) *Sex Differences*—It is perhaps also important to point out that the men and women were influenced somewhat differently by the group of incentives imposed by our experiments and gave evidence of real sex differences in their initial and final ability to react to the problems presented in the several experiments. The following facts bearing upon these differences are most striking and significant.

1. The men seem to be influenced more by the group of incentives arranged in our experiments. That is to say, the men in our stimulus groups made more total and relative gain than did the women of corresponding sections. The per cent of relative gain due to the "will to learn" operating upon the men and women of the stimulus groups is as follows for the first two-thirds of the practice:

Experiment	*Men*	*Women*
1	26.3	20.7
2	60.0	44.1
3	10.4	16.0
4	19.9	8.9

(See also Table II, showing per cent of gain made by men and women in the different periods of practice.) The men seemed also to be more influenced by the approaching end of the practice, their learning curves showing a sudden upward bound in the last three or four practices of the experiment, not shown by the curves for the women of corresponding groups (see especially Figs. 4 and 15). The women show a greater range or variation in initial ability and in improvement.

2. The men in each stimulus group for every experiment save one made more absolute improvement than did the women. In the fourth experiment the women made more absolute gain than did the men, while in the first experiment, which involved rapid and accurate muscular co-ordinations, the men not only improved more rapidly than the women, but showed both a higher initial and final score in this type of performance. In experiment 2 the absolute gain made by the sexes was about equal (compare curves in Figs. 5 to 12). But relatively the men make more gains than do the women (for total per cent of improvement made by each sex in the several experiments, see Table II).

3. The men of Section II made fewer errors in each experiment than did the women of the corresponding section, which, if taken together with the fact of their relatively greater total improvement (compare data in Table II) and their greater susceptibility to our group of incentives as evidenced by their more steady and consistent gains in the stimulus groups, takes on a peculiar significance.

2. *Sources of the Improvement or Gain in Output Made in the Several Experiments*—But a question of as much or more theoretical and practical significance as the fact that this special group of incentives does have a direct measurable effect upon the rate and amount of improvement which a given amount of practice will produce is the problem of determining the factors in each case of learning which make this gain possible and ascertaining the exact avenues through which this improvement comes. In no other way shall we be able to see just *how or why* these increases in score were made under the influence of this special group of incentives. And unless such qualitative studies in all specific instances of learning are made we shall be but little wiser when it comes to the solution of the practical problem of giving proper direction to the learning activities of children and adults in the schools.

To take a concrete example from the many scores of studies that are now being made of reading, it may be pointed out that it will not suffice to measure the progress which learners

make under different sets of conditions of study, or to work out elaborate chains of correlation between different phases of the learning process, no matter how interesting or suggestive such attempts at studying the problem of "learning to read" may be. To make a thorough and accurate study of learning to read we must, in addition to measuring the actual progress that is made under different conditions of learning and sets of incentives, determine just what an individual who is confronted by the problem of "*learning to read*" the vernacular must actually do. We must determine the exact responses or habits which he must acquire in learning to read and ascertain further just how these habits are formed and perfected as the learning proceeds as well as determine the conditions that arise in the course of the learning which hinder or aid the learner in forming and perfecting, for more rapid and accurate use, these particular physiological and mental responses. Only such *qualitative* studies as these can reveal just *how* and *why* the improvement which we measure is made, and they must be made before we shall be able intelligently to direct the activities of the learner in a beneficial way.

(a) *Elements of Gain in Our Several Experiments*—It was not the purpose of this investigation to discover and describe the factors which are responsible for the gains that were made in each type of acquisition which we studied, but to determine whether or not added improvement would occur under the special set of conditions imposed in our experiments and to determine to what extent this "will to learn" would increase the *gain* which a given amount of practice might produce. But in the judgment of the writer the problem of determining the exact elements which are responsible for the improvement itself is of more practical and theoretical importance in any study of learning than that of measuring the amount of improvement that is actually made. Any thorough study of acquisition or learning in any field should therefore involve such a *qualitative* study as we have suggested as well as a quantitative one. Every learning study should determine the actual sources of the gain which is made or describe the specific habits which are formed to account for the increase in skill. It should also determine, if at all possible, the channels through which this improvement comes or ascertain and describe exactly how these necessary habits are formed and perfected as the learning takes place.

To have done this for each of our types of acquisition would have required a special technique which we did not and could not employ in our experiments. Nevertheless a number of important facts bearing on both these problems were deter-

mined in the course of the experiment for each type of acquisition studied. It may in the first place be definitely said that each experiment presented a definite case of learning. That is to say, the procedure in our several experiments did not merely consist of doing the task set in a definite way and learning to do it in this fixed way always more accurately and quickly. Each experiment presented a case of genuine learning, the acquisition in the later experiments being more complicated and complex than in experiment 1. But even in experiment 1 many opportunities were presented to the subjects for the invention and use of new and better methods of control as the practice proceeded. For example, most subjects unconsciously learned in our first experiment, under the stress of increasing their speed, to make the letter "a" in rhythmic fashion, making it three or four letters at a time, thus facilitating greatly the matter of initiating and controlling the three separate movements required to make each letter. They also learned better how to hold their papers, the most advantageous size of letter for them to make, the length of line to make, how to hold and grip their pencil for such quick and continuous work, etc.

That many such improved methods of control were actually invented and used by our stimulus groups was indicated not merely by the observations of the learners who volunteered much valuable information bearing on this point, but by two sets of practice curves obtained from five special subjects who took 100 practices each in making both the letter "a" and the figure "4," when the method for our experiment was being worked out and tested. The problem in these preliminary experiments was to make the small letter "a" and the figure "4" as rapidly as possible for 30 seconds. Fifty practices were taken without a knowledge of score or interest in improvement, alternated with 50 practice periods in which the subjects knew their score and rate of improvement. The curves representing the practices where the subject's "will to learn" was thus appealed to proved to be typical learning curves in four out of the five cases. All five subjects improved their rate during the stimulus practice. But the curves for the control practices showed no improvement whatever, even a slight decline after the first 10 or 15 trials (compare Fig. 17, which is typical).

In experiments 2, 3 and 4 still greater opportunities were presented for the discovery and development of better methods of controlling the situations presented by the problem of learning, as the practice progressed. Just what these elements of improvement are, we made no *special* attempt to determine,

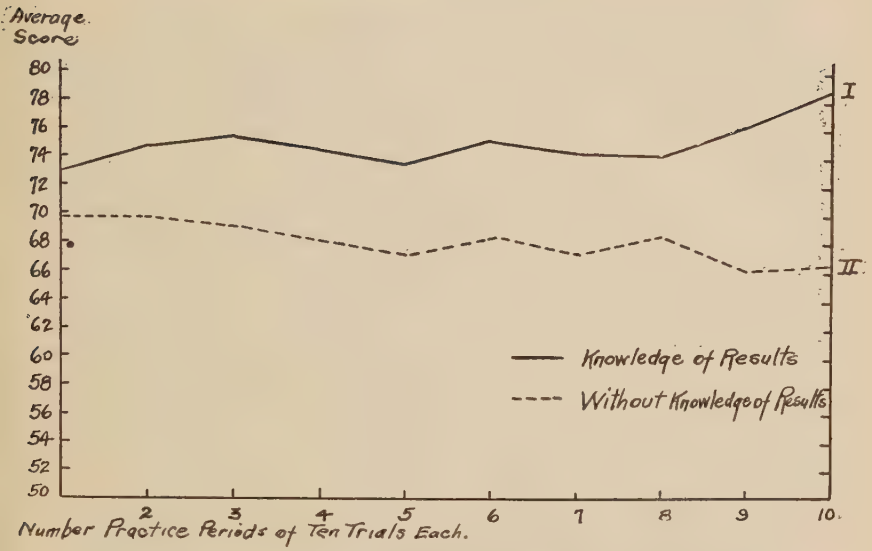

FIG. 17. TYPICAL PRACTICE CURVES SHOWING EFFECT UPON THE SCORE OF INTEREST IN IMPROVEMENT WHEN ONE HUNDRED PRACTICES WERE GIVEN ALTERNATELY WITH A KNOWLEDGE OF THE SCORE (I) AND WITHOUT A KNOWLEDGE OF THE SCORE (II)

as this problem fell outside the purpose of our investigation and method; but as was stated above, a complete study of learning should determine and describe the exact factors which account for the rate and amount of improvement which is being made, and so determine just how these forward steps in the learning are actually brought about in the course of the practice, even describing the exact channels through which the improvement comes. The importance of this group of factors was especially emphasized in the present experiments by the fact that many individuals in all our stimulus groups did not unaided discover these improved methods of control for themselves, indicating that for the more complex types of acquisition, at least, special guidance is needed in addition to furnishing the special incentives studied in this investigation or interesting the learners in the fact and possibility of their improvement as such.

b. *Channels through Which the Improvement in our Several Experiments Came*—That improved methods of control for each type of learning were actually invented by our learners in the course of the practice has just been pointed out. But a fact of even greater importance than the fact of its occurrence is the question of *how* and *why* interest in improvement as

such and faith in its possibility should help to bring it about. In order to understand the exact channels through which this improvement came or how the new and higher methods of control came to be invented and used by the learners under the conditions of our experiments the following facts should be kept in mind: (1) All stimulus sections increased their output in each experiment more than did the control groups.[14] (2) In the experiments where the subjects were most completely exposed to this set of conditions we obtained the greatest effect. (3) In some experiments the stimulus sections, which were subjected to this set of conditions for the longest period of time, made the most improvement. (4) The stimulus sections which made the most rapid gain were also more accurate in their work. (5) It was in practically every stimulus group the brightest students, i. e., those who made the highest initial score, who made the most improvement. That is to say, these abler students seem to have been influenced most by our group of incentives.

Just why the members of these stimulus groups succeeded better in initiating and selecting the more efficient methods of control than did the members of our control groups and how these new and better methods of work came to be employed in the first place was not determined in *detail* in our experiments, but the following facts throw considerable light on the questions involved:

1. There is evidence in our data to show that this interest in improvement and faith in its possibility made the learner's effort more steady, consistent and even intense. That is to say, more energy seemed to be released and in a more steady stream. In the words of one subject, "It seemed to come more of itself and could be directed more easily and consistently upon the proper details of the work." Some individuals, to be sure, were not affected in this way, as has already been pointed out; but the majority of them were.

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[14]One is tempted to try to make a quantitative statement showing the exact value of the "will to learn" for our several stimulus groups, but such quantitative statements are apt to be misleading at best; and the fact that our standards of measurement in the different experiments were of unequal value makes it difficult to make such a statement for our data. But it seems altogether possible to devise a method whereby such a quantitative value for the "will to learn" might be accurately determined for all or most types of learning. Future investigators should at least keep this problem in mind, as it would be exceedingly valuable to know whether or not this factor has a specific and rather constant value for acquisition or whether it depends for its degree of effectiveness upon the type of learning, the disposition of the learner and other factors which help to determine its effect upon improvement. It would be interesting and decidedly worth while to know.

2. This more steady and intensive application of effort to the work in hand made it easier to avoid mistakes and to vary the reactions in ways that naturally called forth the new and better methods of control which, because of their greater success and pleasantness, came regularly to be selected by the learner.

3. This increased success and the greater ease with which the psycho-physical processes involved worked, also gave rise to a more favorable feeling tone which through the operation of the law of effect facilitated for the learner the release of still more energy, which, coming as it did quite spontaneously, tended to flow more easily and surely in the right direction. That is to say, the agreeable feeling tone made it easier for the learner to apply himself more efficiently to his tasks because his energies flowed not only more freely but more spontaneously and easily in the right direction.

4. This excessive energy correctly and consistently applied to the details of the work plus the accompanying favorable feeling tone, when thus coupled with a genuine desire to improve and a firm belief in its possibility, seem also to constitute a more favorable condition for making helpful variations in the physiological and mental responses which furnish the stuff from which the new habits or adaptations in method are made which give the learners their better methods of control, and which, therefore, constitute the real factors of gain in output shown by our objective results. It is the formation and use of these higher methods of control which make the improvement possible; and for the initiation and development of these higher methods of control a genuine interest in improvement as such and an abiding belief in its possibility seem to be a necessary condition, though it by no means follows that such a sheer interest in improvement will bring it about directly or at once. For as already pointed out, many of our learners were temporarily hindered if the thought of gain occupied too prominent a place in their minds while they worked. But if persisted in, it would doubtless eventually lead to the necessary adaptations in method by all normal subjects. It should, however, be remembered that many of our individual learning curves strongly suggest that many individuals must be given definite directions and help, in addition to the special incentives studied in this investigation. Such help, if rightly given, would also prevent much needless experimenting in the case of *all* subjects. That such specific help cannot now be given in any specific case of learning is due to the fact that the process of learning has not been *qualitatively* studied or sufficiently *analyzed* to enable us to

determine the exact kind and amount of help that must be given to make the learning economical and efficient. These and other means of improvement will be discussed in the following section, which is devoted to a more theoretical interpretation and discussion of our results.

IV. Interpretation and Discussion of Results

In the sections which precede we have given little more than a bare statement of our problem, method and results. In the discussion of these results, we desire first of all to interpret the specific facts which were determined in these experiments, but we shall in addition try to point out a wider circle of interpretation for which our data are not made out. We have, however, no special interest in these suggestions or in any explanations here made, further than to see them subjected to further experimentation and their validity established or disproved by the facts.

1. *Why Interest in Improvement and Belief in its Possibility Help To Bring It About*—This study and our exact measurement of the output of 124 subjects in four widely different types of learning give objective evidence or proof for suggestions that have often been made concerning the dynamic and helpful effect for learning of a vivid and constant interest in one's success as such and of an abiding faith in one's own ability to increase his skill in that particular line. All members of our stimulus sections not only improved more rapidly than did the sections of our several control groups, but they became more accurate as well, while the same individuals in the same type of learning ceased to improve and became more careless about their performance when this group of incentives was removed and all other conditions were kept uniform. That such an interest in improvement and a belief in its possibility are directly helpful in producing such gains in learning has long been believed. Our results make it a fact for at least four simple but widely different types of acquisition.

The explanation of these results raises the whole question of the psychology of ideals and purposes, and the practical significance for learning and achievement of faith and belief. Such being the case, or at least appearing to be the case, we feel wholly incompetent to give an exact interpretation of these results, because it was not the purpose of this investigation to ascertain the specific channels through which this improvement came or to determine specifically just how it was induced in our several experiments. Nevertheless, some discussion of the "how" and the "why" of this marked improvement should

be attempted, and it is hoped that the following interpretations will prove suggestive and helpful. But for a complete and verified statement of just *how* and *why* such results are obtained we must depend upon future *qualitative* studies which will be necessary to explain these and other important theoretical and practical questions raised by our results.

As already shown, the progress made by our subjects in the several types of acquisition studied did not consist merely of doing the task set in each experiment in a definite way and learning to do it in that fixed way always more easily and quickly. Each experiment presented a genuine case of learning where old methods of control were being outgrown and left behind as new and more economical and efficient methods of dealing with that situation were formed and perfected as the practice continued. Our problem, therefore, becomes one of pointing out how our special group of incentives aided the learners in *initiating*, *selecting* and *fixating* these more efficient methods of control developed by our several stimulus groups. If such new and more economical habits were developed in the course of the practice they had of course somehow to be (1) initiated or performed a first time, and (2) to be definitely selected or given enough prepotency to get themselves repeated, while the older and less efficient habits are left behind, and (3) they had to be repeated often enough to get the newly formed habit mechanized as a new mode of response to the situations which the problem of learning presented. How do interest in improvement as such and faith in its possibility aid in the solution of these specific problems? No complete answer can be given, for reasons already stated, and others that will readily suggest themselves to the reader. But the following suggestions seem warranted by our data and are offered as the most likely interpretation that can be given in the light of our own data and the results obtained in other studies of the learning process.

(*a*) *Interest in Improvement Served as a Directive Force in Our Experiments.*

1. It is clear in the first place that in our particular experiments the learners' interest in their improvement and the desire for further and continuous gain which we aroused in our stimulus groups made the learners keep closer track of their procedure and score. The fact that they were required to keep track of their score gave them a definite method for determining the cause of their success or lack of success, as the case might be. This aided in the selection of any new and more economical method of control which might be accidentally or otherwise originated in the course of the practice because of the

varied responses that were induced by the desire for such improvement. By thus making them directly aware of their failure and gain, the learners were enabled to ascertain not only the things which brought about success but to note the things which caused failure. It therefore indicated to them the direction in which to vary their psycho-physical responses to perform the task always more quickly and well, and aided them in initiating and selecting the better methods of control, which the desire to succeed brought on quite naturally through the process of varying the reactions of the learners in all possible ways or until such a more direct, economic and successful response to the situation presented by the task of learning was called forth. It also helped to eliminate, by heightening the unpleasant effect which they produced, the psycho-physical responses that were wrong and that did not further facilitate the tasks which the learning presented. Both types of response are about equally often called forth in the natural course of all such cases of undirected human learning as those required in our experiments. Without this interest in improvement as such and an *exact knowledge of the results* a *wrong* or *inefficient* method of response may be formed and practised until fixed as a set type of reaction to the task imposed by the learning,[15] or the learner may continue to respond by methods of control which succeed but which do not constitute the type of response that is used by the expert. The learner simply becomes satisfied with a method of control that is successful but far too slow for the highest type of performance that is possible for him to attain. *With* a knowledge of his score and interest in his own improvement coupled with a confidence in his ability to make further gains in that field such wrong habits cannot be formed or fixed, because all wrong and inefficient habits accidentally formed in the course of the learning will be promptly eliminated and the learner's responses varied indefinitely or until a better method of control is initiated and selected. The old adage "Where there is a will there is a way" simply meant in our experiments that if a learner really believed *that there was a way* and was sufficiently interested in finding it he would somehow discover and use that way for himself. Without this interest and belief the thing simply does not and perhaps cannot happen.

For all this a knowledge of one's score and an awareness of the improvement or failure which is actually taking place

[15]See article by C. H. Judd, "Practice without Knowledge of Results," *Psych. Rev. Mon.*, Supplement VII, 1905, p. 185-98. Also C. H. Judd, "Practice and Its Effects in Perception of Illusions," *Psych. Rev.*, IX 1902, p. 27-39.

are a helpful condition. It shows the amount and quality of the *defect* which is to be overcome, because the learner is encouraged to compare his record of achievement with a real standard. It may also indicate the direction in which improvement must be sought and so help to bring it about by controlling the variability of the new responses. What is needed in future studies of learning is a more detailed and accurate determination of the exact ways in which the forward steps in *all* fundamental types of learning are actually brought about so that the process of learning may be more efficiently *directed* and thereby made more economic and secure. Until this has been done for all important types of learning, the learners must proceed *undirected* or with such direction as our rough trial and error methods in education now enable us to give. Until this shall have been done the mere desire for improvement and a firm and steadfast belief in its possibility will continue to be of vast practical importance to all learners who must be *their own directors* and therefore proceed in the business of learning by the trial and error method.

2. But this "will to learn" and interest in improvement direct the learner in still another way. They bring into operation the law of effect, and make it possible for this law to operate in forming and mechanizing the more economical habits of control to be formed. The intense desire for improvement as such which we aroused in our stimulus groups made the attainment of this goal intensely pleasurable and every reaction which impeded this progress displeasing. This made it possible for the law to operate in a direct and helpful way by further stimulating all the activities (mental and physical) which brought about success, because these would certainly be felt to be pleasant to one keenly interested in improvement as such, and by eliminating all responses that led to failure, for the same reasons. In other words, by directly interesting our subjects in the fact of their improvement, and by our method of accurate measurement which revealed to them when and how much gain they were making, we made a successful appeal to one of the most compelling and deep-seated laws of living organisms which in its more primitive and harsher aspects we call fear, hunger, pleasure or pain, and which remains not merely the controller and director of the general activities of living organisms but is one of the compelling directors of the whole process of learning as such. Without a knowledge of one's score and an intense interest in one's improvement as such this law cannot operate.[16]

[16]Compare on this point an article by Harvey Carr, "Principles of Selection in Animal Learning," *Psych. Rev.*, Vol. 21, 1914, p. 157-68.

(*b.*) *Interest in Improvement and Belief in Its Possibility Aid Mental Adaptation and the Formation of New and Better Methods of Work*—But what is perhaps still more important for attaining the highest success in learning and for explaining the results which we obtained in our experiments is the intensity and persistency with which this idea of success is held in mind and the consistency with which the learner works under its guiding influence. An exact knowledge of one's score not only indicates the quality and character of the defect which must be overcome by the learner but gives a definite standard with which the learner may compare his achievement. If now he is genuinely interested in making further gains and believes that this is possible for him he puts more energy into the work. In other words, the character of his interest in improvement as such and his belief in its possibility determine the intensity and persistency with which this idea of success is held in mind, the intensity and persistence of this idea help to determine the kind and amount of effort which the learner puts into the practice. There is much evidence in our data which shows that this desire for improvement, when coupled with a belief in its possibility, enabled the learners to release not only *more* energy but to direct it more easily and readily towards the right details of the work. In other words, under the influence of this special group of incentives the learner was able to call forth the best effort of which he was capable and to do it more easily and consistently and therefore to practise the performance always on the highest plane yet attained. This enabled him to practise and fix the highest order of habits which he had thus far developed, a phase of the learning process which was found to be an essential condition of the acquisition of skill in learning to use a typewriter.[17] Without it the learner simply settled down on a plane of writing far below the limits of his best performance, and continued the practise, quite successfully to be sure, but with the use of habits of control far less economical and slower than those used by the subject at his best periods of work. Some of the plateaus in these earlier learning curves were caused by the fact that the learners did not put forth enough effort to keep themselves practising always with the highest method of control which they had thus far been able to use, but were content to use a slower method of control, one developed and used in the earlier stages of the practise. In a word,

[17]Compare Book, W. F., "The Psychology of Skill," *Univ. of Montana Studies in Psych.*, No. 1, 1908, see p. 159-66.

they failed to push themselves along to the point where the more economical methods of control would be invented.

Intense and steady interest in improvement when coupled with a confidence in the possibility of further and continuous gain such as we instilled in the minds of our stimulus groups, therefore, not only keeps the learners practising with the highest method of control which they had yet discovered and used, but makes them vary their reactions more and more as the practise progresses, under the impelling force of this "will to learn." It was this set of conditions which enabled and forced them to initiate the new and more favorable adaptations in method that made the reactions of our learners to the performance of the task always more economical and rapid. In this manner did the group of special incentives arranged in our experiments lead to the invention of new methods of control and to the selection[18] and practise of those modes of response which proved to be most economical and efficient for the tasks which the learning presented. Without this extra effort *consistently* and *persistently* applied these new and better methods of control were not brought into play, or if originated they simply remained hidden from the learner because he was content to do the work in the slower and less economical ways already learned.

It is in some such manner as this that our group of special incentives helped the learners to overcome the more elemental and inefficient methods of control that were used in the earliest stages of practice and to conquer the many special difficulties which each case of learning presented. But it should also be pointed out that this desire for success and faith in one's ability to improve not merely influenced the character of the learners' reactions in the ways just described. They helped to determine what particular emotional tone would accompany this practice. As long as the learner has faith in the possibility of his success he can and will continue to try and

[18]That our group of incentives aided the process of selection seems clear from the fact that in each of our experiments our stimulus groups made more rapid and consistent gains than did our control groups. This could not occur unless more efficient methods of control were initiated, selected and mechanized during the practice. We have shown how the desire for improvement increased the variability in the psycho-physical responses called forth by the extra energy put into the work, but just how or why these more economic responses get their prepotency and come to be selected and fixed in the course of the practice is not easy to see. That this step in the learning is aided by a knowledge of score and desire for improvement can scarcely be doubted. That some improvement can take place without it or by the substitution of hunger, fear, or other incentives to effort the studies of animal learning show rather conclusively. See article by Carr, *Psych. Rev.*, Vol. 21, p. 157-68.

his performance will not be disagreeable even though he fails to improve for a time. This attitude and belief therefore enable him to continue his practice at high speed and to release more energy, even to direct it more economically and successfully than he otherwise would be able to do. It is the belief that no more improvement is possible for him, that he has reached his physiological limit, which dries up the learner's springs of effort and makes further improvement in that direction all but impossible for him. Until confidence in his ability to improve has been restored by necessity, interest, or some other means, further improvement cannot be made. It is in some such way as this that the "will to learn" unlocks the gateway to a learner's stores of energy and so enables him to put forth more effort, even to expend it more and more advantageously upon the details of the work. It produces an attitude of both body and mind which affects directly and favorably not only the process of initiating the new and necessary habits which must be developed but effects the flow of associations already developed and thereby aids the proper mechanization of the highest order of habits already formed, a process which is accomplished in part by making the learner always more satisfied or pleased with his success and more dissatisfied with his failure.

It is in this sense that the desire or wish is father to the act. Belief in the possibility of success and a persistent desire for further improvement seem to be a necessary condition for the invention of the more economical methods of control required to attain the higher levels of skill in human learning. Without it the learner simply will not push himself on to the point of varying his reactions sufficiently to hit upon the more successful method of work but will continue to work like Bryan's telegraphers at "Podunk," or Kitson's printers, with the lower methods of control that have earlier been developed and which are sufficient to hold their jobs in their present position but with methods of control far inferior to their best response. But when a keen interest in improvement is aroused or when confronted by grave necessity or the need for an increase in skill a ceaseless experimenting in varied reactions begins in these same individuals and continues until a new and better method of control is found and laid hold of by the learners. It is a case where faith in one's ability to succeed and the desire or necessity for improvement actually bring it about.

There were scores of individual instances in each of our experiments which bear out the above assertions—cases of learners who for six, eight or ten practices had not made any

measurable improvement and who openly declared that no further improvement was possible for them because they thought they had reached the limit of improvement and frankly stated that they had. These cases were uniformly treated in the following way. The subject was assured individually that his limit of improvement *had not been reached.* He was told that he would continue to improve if only he made up his mind to do so. As an aid to this end he was asked to set a definite goal a little ways ahead of the point reached in the previous practice and asked to make up his mind *definitely* to reach that point the next practice. There was not a single instance in all our experiments where this device did not prove successful in bringing about the desired improvement. But there were many instances, on the contrary, where certain subjects in our stimulus groups made a mistake of some 8 or 10 points in counting their score and recorded in particular practices a score that many points higher than was actually made. Yet in the succeeding practices of these individuals this fictitious score was not only attained in the next practice but regularly surpassed by the usual amount of gain in succeeding trials. And it should be added that such instances were not mere isolated cases, but were commonly found by the writer and his assistants who helped to give the tests.

Too much cannot, therefore, be said of the practical value of the mental set induced by the special conditions arranged in our experiments as a facilitating agency in human learning. It makes the learner a different reacting agent, more ready to exert himself on the task in hand, more ready to make the right responses, and makes it easier for him to select the responses that are successful. It increases the accuracy of his work and makes him more pleased with his successes and displeased with his failures and in other ways aids him in the formation and exercise of the higher methods of control which must be initiated, selected and finally perfected to increase his skill in that line.

It is also more than probable that the attitude of mind which our group of incentives induced in the learners lessens the chances for fatigue because it makes the right responses more ready to act, more easily controlled and so less expensive to the organism. As one of our subjects put it, "When I am interested and succeeding the right movements seem to come and follow each other in proper order more of themselves." It is also quite likely that success and faith in one's ability to improve make it possible to release more energy and perhaps to tap unused stores of energy not tapped heretofore. Also to

apply it more easily to the details of the work and to the business of varying one's mental and physical reactions in a way that will initiate the higher methods of control. This much seems certain: it helps the learner leave behind his older and slower methods of work and so to vary his responses to the situations presented by the learning that the more economical methods of work may be invented and used.

A word might also be said about the general validity and significance of this interpretation of our results. Interest in improvement as such and confidence in one's success are among the strongest incentives not merely in learning but for all human endeavor. Every successful scientist is intensely interested in seeing his own hypothesis or theory confirmed or disproved. It is this interest in his results that literally drives him on and on. An idiot or man or woman who makes no progress in his or her work is not interested in making hypotheses or in trying them out. But an investigator or inventor has a keen and abiding interest in the problem he is studying and in the hypotheses which he makes. In science this interest in a hypothesis must be balanced by an equally keen nervousness lest one become deceived by his discovery, as in learning the progress of the learner must be checked up by accurate measurements and definite standards which show not merely what has been achieved but what really may or ought to be attained. In science and our search for hidden truth this necessary feature of the learning process has been crystallized into a method of verification called scientific technique. This enables the scientist to verify his findings *ad libitum*. In learning, each subject should measure his advancement by a reliable and definite standard. For to be successful this "will to learn" must be more than a mere empty desire for improvement or sheer act of will. The desire for improvement must be continually checked up by fixed and reliable standards. For without such standards or methods for measuring the results actually attained our group of incentives would be powerless to produce its helpful results; *with* the aid of a reliable standard and an accurate method of measurement the learner is able to release more energy and to apply it always more economically and surely to the right details of the work. This being the case, we should make a more careful study than has yet been made of the exact ways in which this "will to learn" and belief in the possibility of improvement may best be instilled in individual learners.

2. *How "Will to Learn" and Confidence in Success May Best Be Aroused and Maintained in Learners*—Several years of experimenting with intelligence tests, coupled with a more

or less careful study of the causes of success and failure in school and life, have convinced the writer that persistence, or the tenacity and steadiness with which an individual attacks his tasks in learning and life, has as much or more to do with his ultimate success as does his native mental endowment.[19] Many observations were made in the present experiments which point in this direction. In the section on results it was shown that some individuals were influenced directly by this special group of incentives; others seemed to be less impressed. For some this influence reamined steady and continuous; for others it was unsteady and erratic. A few could not be directly or permanently interested in their improvement as such by the directions and devices which we employed in our experiments. When we consider how important for advancement in learning this interest in improvement and belief in its possibility really are, the question of how such interest and confidence can best be aroused takes on a new and peculiar significance. For arousing this attitude of mind or such a helpful mental set towards the task of learning, the following devices are suggested by our data:

1. It would prove helpful if the learners could be shown, by actual figures and facts, such as we have obtained in these experiments, that this desire for improvement is not mere empty phrase or theory, but a necessary condition for advancement in learning.

2. Learners should also be made to feel that it is really worth their while to make an effort to advance because it is sure to be rewarded by success and therefore is of practical worth to them. In observation it has been found, for example, that people observe best those things in their environment which have some practical significance for them. To become interested in his own improvement the learner must, therefore, somehow be made to feel that such an interest is really desirable and worth while for him.

3. A third aid is to have a reliable method of measuring the progress in learning that is actually being made and a just standard for evaluating the results of such measurement, one which will enable the learner not merely to measure the progress he is making but to evaluate all he does in terms of what might reasonably be expected from him or from an average learner at least; a standard which takes into account the fact of individual differences in capacity to learn as well as world standards of achievement derived from the records of the most

[19]We are speaking here only of those who have a moderate or normal grade of intelligence. For persons whose intelligence is distinctly subnormal this would not hold.

successful workers in that field. Standards play a very definite and direct part in all human efficiency and development. A genius in music will set a new standard for a host of lesser geniuses who forthwith measure up to his plane of achievement. A reliable standard and method of measuring progress in learning are therefore one of the surest ways of helping the learner to bring it about.

4. Again, by keeping the learner succeeding and by actual measurement he may be assured that his limit of improvement has not been reached. This can best be done by directing his practice and work in such a way that he will continue to improve. If we give him the kind of guidance and direction that will enable him to succeed and then demonstrate for him by accurate measurement the fact that he is actually succeeding he will be given the necessary confidence to feed his interest and desire for even greater success. In learning, as in everything else, nothing succeeds like success; and to keep the learner succeeding he must believe in its possibility, be interested in improvement as such, and be given enough guidance and help to keep him succeeding.

Such help cannot always be given, for the simple reason that the different types of learning have not been studied sufficiently to determine the facts needed to give our learners the kind of help they need to make their progress economic, continuous and sure. But as we cannot wait in actual life until the whole truth has been determined and verified, so in teaching we must do the best we can without these facts. Until such studies are made we should make special and constant appeal to the "will to learn" and arouse in each learner a strong and abiding belief in the possibility of his own success. For it is the necessity or desire for improvement and the belief in its possibility that actually bring it about in all cases of *undirected human learning* where the problem of initiating and developing new and higher methods of work is left for the learners to work out for themselves.

5. Other incentives which might be used to arouse a pupil's "will to learn" are to demonstrate the fact that others have and are improving beyond the point attained by him; that others have also failed for a time as well as he, but that they have succeeded in mastering all the difficulties involved. This may be done by using a typical learning curve with its early rapid rise, its plateaus and its later slow but more gradual rise, explaining the cause of each. For reasons which have already been indicated, one of the most important problems in any field of acquisition is to determine just how the learners in that field may have their interest in their improvement

awakened and sustained throughout the practice. Most learners and teachers fail just here because the importance of the problem is not recognized and because they do not know how to induce in themselves or in their pupils a lasting interest in the work or make them feel that further progress can and really should be made.

3. *Why Many Learners Fail To Improve*—The reason why so many learners fail to make the improvement which they really should make may be due to any one or some combination of the following causes: (1) They may feel that they have more important things to do and so are not interested in their improvement as such. They will, therefore, not make themselves rise above the common level of mediocrity. (2) They may desire to improve but do not care enough about the improvement to put forth the effort that is required to develop the new and more economical methods of control. (3) They may need specific direction and help because they do not know how to direct their own practice. (4) They may be unable to put forth enough effort to carry on the ceaseless experimentation which is required to enable them to discover the more economical methods of control for themselves. Better methods, better directed learning, more zeal, actual interest or motivation and a firm belief in the possibility of success sum it all up. It is a deficiency in one or more of these respects that accounts for the failure of most or all individuals to make their rate of improvement steady and continuous.

But it should be pointed out in closing that what is just as important as arousing this "will to learn" and a desire for improvement is to know *when* such a desire should be aroused and definitely appealed to and when all atempts at further improvement should be discontinued and definitely discouraged. It is not desirable to attain perfection or the highest degree of success that is possible for an individual in every type of acquisition that he takes up. No one would insist today on having all learners attain the highest possible speed and accuracy in addition. The adding and calculating machine has made this unnecessary. Perhaps if more attention were given to the *amount of success* or *degree of skill* which each individual *should* attain in each type of learning, their desire to improve in the fields where advancement really should be made could be more easily and surely aroused because it could then always be shown to be necessary and worth their while. Is it not because we use so little judgment in regard to what really should be learned and in regard to the limits of skill which ought to be reached in each field of acquisition that learners so often develop the attitude of mind

that it is not worth their while to try, and so fail to become interested in making all the improvement that is possible for them? It is of course also important to apply the well-known principle which Senator Stanford found so effective in the training of his young colts, when he said: "It is my aim to get the greatest amount of exercise without fatigue, and never to allow it to reach the period of exhaustion. . . . If colts are never over-worked they are always willing to try in their exercises, having no apprehension that they will be forced beyond their comfort."

EDUCATIONAL DEPARTMENTS OF CORPORATIONS IN THE PITTSBURGH DISTRICT

By Donald Dwight Kennedy

In the last ten years the corporation school as a factor in American education has come rapidly to the fore. A growing need has been felt by business men for the more highly trained worker; for the worker who has received training of a different type from that offered by the public schools in general. The attempted solution of this explains the rise of the educational training department among corporations.

A utilitarian purpose is at the bottom of the growth of such a department. The corporation school is established and maintained to increase the efficiency of the individual worker, and thus to increase the efficiency of the business as a whole. The accomplishment of this aim is determined by business men on a practical basis. The corporation school will be continued only so long as it does more efficiently and more economically than otherwise possible the following things:[1]

(1) Make available more highly trained workers.
(2) Make available more employees who are capable of filling higher positions.
(3) Increase the quality of product.
(4) Decrease labor turnover.
(5) Decrease waste.

The corporation school has experienced the most of its development in the last twelve to fifteen years.[2] The first apprentice school was established in 1863 by the Chaix Printing Co. of Paris. In America the first attempt along educational training lines by a business concern was that made by the R. Hoe Printing Press Co. of New York. Their school was established in 1872. The movement did not gain ground until about 1905, however. In 1902 the General Electric Co., West Lynn, Mass., established an apprentice school. Their example was followed by the R. R. Donnelley and Sons Co. of Chicago, in 1908, and by the Southern Pacific Co. in 1909.

[1]A. J. Beatty, "Corporation Schools."
[2]A. J. Beatty, "Corporation Schools."

The pioneer of the corporation school movement in the Pittsburgh District was the Westinghouse Electric and Manufacturing Co. at East Pittsburgh, Pa. The Westinghouse Technical Night School was founded in 1902, followed by an apprentice school in 1906. The Carnegie Steel Co. established a sales school in Pittsburgh in 1910, and in 1913 founded an apprentice school.

This movement in industrial education took real form and assumed wide significance in 1913 when a National Association of Corporation Schools, later changed in name to the National Association of Corporation Training, was formed.[3]

On January 24, representatives of forty-eight companies assembled in New York, constituting the first meeting of the Association. By the 1921 assembly one hundred and fifty-six industrial and commercial companies were on the member list. The object of this National Association is "to assist management in developing the principles and practice underlying the training of employees by co-operating with member companies through research work and exchange of information as well as with educational institutions in the establishing and sharing of suitable training courses to the end that the general level of efficiency in industry be elevated."

Investigation revealed that twenty corporations in the Pittsburgh District (a circle with Pittsburgh as the center and a radius of about twenty miles) were conducting educational training work. These corporations were of three types—commercial, public utility and industrial. Of the twenty mentioned, six are commercial concerns, four are public utility companies, and ten are industrial corporations.

The training program in the commercial field is the first to be considered. Six Pittsburgh department stores have established training schools with special staff, equipment and organization. Salespeople, cashiers, wrappers, inspectors, assistant buyers, elevator operators, floormen and in some cases managers receive training in this department.

In department stores, the work of the educational training department is of three general types—initial training, follow-up training and group instruction. Initial training applies to that portion of the work which deals with the introduction of new employees into the store. Such training is given only as occasion demands, and, for the individual person, lasts for relatively a short time; never for more than two or three weeks, often for only two or three days. Follow-up training

[3]National Association of Corporation Schools, *Proceedings*, 1904.

is training on the job and is carried on on the selling floors of the store. It consists mainly of a checking-up process by observation. A large portion of the time of the store instructors is spent in this type of work, much emphasis being placed upon its effectiveness. Particular attention is paid to new employees during the first month or two of their employment. Group instruction includes all group meetings called for informational purposes.

The instruction in the initial training period consists of training in store system, service, type and characteristics of merchandise, salesmanship, and policies and rules. Of course the exact nature of the training depends upon the position which the new employee is to fill. New members of the store force receive this preliminary training during the first mornings of their attendance at the store. At least three such mornings are consumed. After that they come back for a few final lessons in salesmanship and merchandise.

In the follow-up training the instructors of the educational department go out through the store and observe the employees at work. In this way an actual check on the efficiency of the individual is obtained. In the main this type of training conforms to the following lines: general appearance and neatness, sales efficiency, system operation and merchandise knowledge. Store instructors spend most of their time on the selling floors of the store, observing, noting mistakes, assisting, and making corrections.

No definite schedule, either as to time, length or subject matter, is followed in group instruction. Groups of from fifty to one hundred and fifty are called in from time to time as need arises. One store gave a series of motion pictures, including processes of manufacture and methods of marketing of goods. So called "pep" talks were also frequently provided. New lines of goods or changes in system call for frequent group work. The usual time for this type of classroom work is between nine and ten in the morning, and between four-thirty and five-thirty in the afternoon.

The number of instructors engaged in the educational department varies from stores having only one teacher to one store where there are six instructors. Out of the total of sixteen instructors engaged in this work seven had approximately a high school education while nine have had higher education. Above all, experience in mercantile lines and store work is requisite. For instructors the management demands people who are well versed in the methods and problems of store selling.

The term most generally used in denoting this phase of

store work is that of Training Department, or Educational Training Department. The head of this department is called Director of Training or Educational Director. In four stores he is responsible to the store superintendent; in two stores he or she is responsible to the personnel manager.

The second group to be considered after having finished with the commercial field is the one including four public utility corporations. The training work in these companies is carried on, first, by means of a plant school; second, by means of vestibule schools; third, by means of correspondence courses.

By a plant school is meant a definite department organization with physical equipment and isolated location, established for the purpose of instructing and training employees in plant processes, elementary and advanced. The courses offered are of the intensive type, requiring thorough training in numerous operations, and requiring a long period to complete the series. A vestibule school offers short-term intensive training courses in single units to develop ability to produce in some particular line. Correspondence courses are those carried on by written instructions and answers, and are individual.

A telephone company has organized a plant school for the training of plant employees—employees engaged in the maintenance of wire, cable, and central office, in construction of new equipment and in repair work. The school is located on one of the upper floors of the plant building and consists of one room of about twenty-five hundred square feet area in which is placed all the apparatus in connection with telephone work.

The employees of the company are classified according to the type of work they do—central office, installation, line, cable, repair. They are also divided into apprentices and advanced workers. There are four apprentice grades and six advanced grades in each division. To each division and to each grade there is a corresponding course in the plant school. In addition there are about ten special courses, making in all a total of sixty-five courses.

It takes from four to five months to complete the four apprentice courses. Each course lasts for about one week, but intervals of from three weeks to two or three months intervene during which time the employee is acting as a helper.

When the apprentice courses are finished the employee becomes a productive worker of advanced grade. There are six higher courses for each of the five groups of plant work. These courses vary from one to three weeks in length, the student entering at any time and leaving when the course is

finished. To take one of these courses the employee must be recommended by his division head.

The school is open from 8 A. M. to 5 P. M. except Saturdays, when it closes at noon. One distinctive feature is the fact that all instruction is individual, no classes being held. This permits employees to commence any course at any time, and to leave school when the appointed amount of work is finished or the required skill is secured. Each student has certain specified tasks to do which he accomplishes through the instructor's guidance, through standard specifications and through the instructor's notes. Attendance at the school during the period of enrollment in it is for the full day. At the same time the employee receives his regular rate of pay. Grades are obtained from two sources—examination of manual work, and tests. An average grade is obtained and placed on the school report.

Three instructors compose the staff. About twelve students are in attendance at any one time. During an average month there are about thirty courses given to an average of seventy employees. The school is closely tied up with the various superintendents and heads of departments of the company. Division heads make all recommendations for school training, and receive definite reports of progress from the school supervisor.

Vestibule schools are operated by the telephone company above mentioned, and also by a street railway company. For the purpose of training girls as central telephone operators fifteen to twenty instructors are engaged in the school. Their work consists in giving instruction in policies and rules of the company, and in training in the actual manipulations and operations attendant upon successful exchange work. Motormen and conductors receive their training in the vestibule school of the street car company. A school car is maintained in which new employees are instructed under experienced operators.

Correspondence courses are conducted by three companies. One course in the elementary laws of electricity and telephone theory runs for a year. Approximately one hundred students complete the course in a year. Another company has a series of six correspondence courses including mathematics and mechanics, heat, steam boilers, steam engines, gasoline automobiles, and business law. Still another company offers a similar series to employees, including in addition commercial engineering, and advanced electricity. Enrollment was about two hundred students in the last two series. A nominal tuition is charged per course, which is refunded upon satisfactory

completion of the course and remainder in the company. One unique feature consists in the appointment of advisors for each of the courses, these meeting with students for general discussion once or twice a month.

In brief summary the training programs in the public utility field are of two types—training for a specific position, and training of a general nature. The plant school and the vestibule schools give training for a specific position. On the other hand, the correspondence courses provide training of a general nature.

Having considered the commercial and industrial fields, the final division, the industrial group, remains for discussion.

As near as could be determined ten industrial corporations in this distict are conducting definitely organized educational training work. Definite data as to the number of workers which are employed by these companies were not available, but it approximates thirty-five thousand men and women. The actual number of people to whom is open opportunity for training does not surpass fifteen thousand. About three thousand are enrolled in classes or course series.

The different classes of employees to whom such opportunity is afforded vary with the company. In some companies some opportunity is provided for all. In others, classes are open to plant employees, apprentices, foremen and supervisors, office employees, technical school graduates, salesmen, women and negroes. The apprentice system is different from that of the preceding age, although retaining the same fundamental purpose. Restrictions are not as great, length of apprenticeship does not exceed four years, and a definite wage is paid. The classification office employees includes workers in business offices, general offices and drawing rooms. The technical school graduate group denotes those young men who have just finished their engineering courses and are now being inducted into industry.

In surveying the different educational departments it was discovered that the training programs in operation could be grouped into four types: (1) training for a specific job; (2) training in company business as a whole; (3) training of a technical nature; (4) training of a general nature. Training for a specific job includes such courses as those training apprentices to be machinists, pipe fitters, etc., and such ones as those preparing women to be stenographers. Training in company business as a whole is illustrated by courses given foremen in the industrial and manufacturing processes of the plant. Training of a technical nature, the third type, in-

cludes programs for technical school graduates with a practice study plan in operation; it includes also engineering courses for plant employees. The last type, training of a general nature, includes Americanization and English schools, cultural classes and courses for women in sewing and domestic science.

Several different types of schools have been established to carry on this education work. Three night schools are in operation; four apprentice schools, five English schools, one technical graduate school, two sales schools, one office training school, one works school and three foremen schools are also being conducted.

The night schools were established, in the main, to provide an opportunity to employees to obtain instruction in cultural subjects. Some technical instruction, however, is also provided. One company has a night school with an enrollment of over one thousand. The school is governed by a Board of Trustees, and managed by a president, secretary, and manager. The president is also the manager of the educational department. This night school has five departments—engineering department, preparatory department, foreign department, special technical department, and women's department.

The engineering department has a four years' course in fundamental engineering principles. The preparatory department has a two years' course in public school subjects, affording employees an opportunity to finish their graded school course. The foreign department has a two years' course in written and spoken English and in Americanization for foreign-born men and women. The special technical department offers special courses in advanced technical lines. The women's department gives a two years' course in sewing and in commercial branches; a one year's in preparatory training and in calculating-machine operation; special courses in training in English and dictation for stenographers and in millinery.

Classes are held on Monday, Wednesday and Friday nights. The year consists of two terms of nineteen weeks each, beginning September 7 and ending about June 6. Admission is open to all employees and wives without regard to previous education or occupation. The school is located in three public school buildings of the community, all within fifteen minutes' walk of the plant entrance. The expense of the school is borne about equally by tuition charges and company appropriation. Graduates of the engineering department and of courses in the women's department are granted diplomas.

A faculty of seventy-three members takes care of the class and shop work. Of this number, sixty-seven are company employees, and six are otherwise engaged. Eight of the faculty are graduates of that same night school, thirty-three have collegiate degrees, and seven have higher degrees.

A students' association has been organized with duly elected officers to supervise and manage all student activities. These include a string orchestra, an official school paper, football and basketball teams, and social functions such as dances, plays, concerts, banquets and smokers.

Another night school with an enrollment of over two hundred is in operation. Here also the purpose is to offer to employees an opportunity to get some of the cultural and theoretical subject matter which they would be unable to obtain otherwise. The courses offered are in Americanization and English, drawing and mathematics, physics and chemistry, and electricity. Classes are held two nights a week.

The foreigner who does not understand and cannot speak English gives an excellent chance to the industrial "trouble maker" to cause friction and bad feeling. The foreigner, too, in places where he understands neither the conversation of his co-workers nor the commands of his superiors, is often sullen, morose and unapproachable. To combat such situations Americanization classes and English courses have been organized.

The training offered, then, by English schools is general in nature, the sole purpose being the instruction of foreigners. The benefits from such instruction are three—to the worker, to the company, and to the state. It benefits the worker through enabling him to master his environment with more ease; it benefits the company through making its employees more efficient; it benefits the state through making these people better citizens.

Several companies carry on their Americanization work in night schools. The companies that do not have night schools have distinct English schools and are co-operating with the Board of Education in the training of the foreign employees. The plan consists of the Board supplying the teachers and the company furnishing the equipment. The time of holding these classes comes in the late afternoon after work is finished. One company follows the plan of giving their English classes on Sundays.

The training of apprentices is carried on in apprentice schools and is distinctly of the training for a specific job type. Pattern maker, foundryman, machinist, tool maker, electrician, printer, draftsman, blacksmith, boiler maker, carpenter,

mason, pipe fitter and roll turner are some of the trades for which apprentices are at present being prepared.

The training program of apprentices is twofold, consisting of (1) shop work and (2) classroom instruction. The shop experience consists of the usual manual training in the use of tools and hands in connection with the particular trade. As an example, the electrician "acquires a broad and thorough knowledge of the construction and operation of electrical machinery. The experience includes the construction of switchboard details, the wiring and assembling of switchboard and control panels, factory wiring and the installation of electrical machinery. After the apprentice has a thorough knowledge of these details he takes up the winding, connecting and assembling of motors and generators. This is followed by experience in winding, building and mounting of all types of transformers. He is then assigned to the testing department where he obtains experience in determining the electrical and mechanical characteristics of the various types of apparatus which he has helped to build in the shop. Opportunity is also offered for special work on steam turbines and condensers, pumps and reduction gears, on meters, instruments and fan motors, and on domestic and industrial heating appliances. During the last year opportunity is given to specialize in some branch of the work for which he is best fitted. This training particularly fits young men for the manufacturing, testing, selling, service and operating fields of the industry."[4]

The classroom instruction received by the apprentice consists of a minimum of four hours per week during the entire course. Classes meet from 7 A. M. to 9 A. M. in a classroom of the educational department for the study of mechanical drawing and practical shop problems. All work is taken from points in the actual experience of the apprentice, no texts being used. The instruction in mechanical drawing includes blueprint reading, sketching, layout problems and tool design. The instruction in shop problems includes problems in English, mechanics, shop system, algebra, geometry and trigonometry, and their relation to shop work. In many cases the fundamentals of the sciences applicable to the trade are made a part of the course. Two additional hours each week are required of the student in home work. Instructors are obtained for the trades apprentice school from the engineering, drafting and shop departments.

Definite shop schedules are maintained for transferring

[4]Westinghouse Elec. & Mfg. Co., "Trades Training."

apprentices from one department to another. These are administered by the educational department.

Necessary qualifications for entrance into the company as an apprentice are:

(1) Be between 16 and 19 years of age.
(2) Have physical vigor.
(3) Have a good moral character.
(4) Have a good elementary school background, especially in history, geography, English and arithmetic.
(5) Have two years' high school training for electrical course.
(6) Be able to present letters of introduction.
(7) Have a personal interview.

The first three months of the work constitute a probation period. At the end of this time, if the apprentice is willing, and exhibits the right characteristics, he is regularly employed as a member of the organization and enrolled in the apprentice school. At this time an apprentice agreement between the company and the boy in conjunction with the parent is executed covering the entire term of service. These trades courses consisting of supervised experience in the shop and instruction in the classroom cover a period of four years, the apprentice observing regular shop hours. The compensation of the apprentice is determined on an established basic schedule, and is advanced every six months.

A complete record of the shop work and classroom work of each student as reported by shop foremen and instructors is maintained and kept on file in the office. Apprentices who maintain an A grade can complete their course in forty-four months instead of in forty-eight. A certificate is issued by the company to each graduate trades apprentice upon his completion of the course.

The length of apprenticeship varies slightly in different companies. One steel company sets the period at three years, but the most general length is that of four years. The number of apprentices enrolled in apprentice schools in the Pittsburgh District is close to two hundred and sixty-four. Such schools are in existence because it has been found that boys can be trained in the theoretical and practical aspects of their particular trade in a quicker and more efficient manner if this training is conducted under the supervision of a training department organization with definite procedure and requirements established.

Sales schools are conducted for the purpose of teaching

company business as a whole. These courses are characterized by a short intensive period of training during which the entire time of the student is spent in grasping the fundamentals of the manufacturing processes used in the production of the company goods. This is accomplished by morning lectures, afternoon inspection trips and the requirement of papers and reports.

One company has a type of office training school in which employees are trained for stenographic and clerical positions in the offices, the period of instruction varying from five days to three weeks.

Another school which is entitled a works school is operated by a steel company for the purpose of making available instruction in the manufacturing processes of steel making to all employees. This instruction covers a period of two years, four hours per week, the class using the book "Making, Shaping, and Testing of Steel" which was compiled by the educational department of that corporation. The students are excused from work to attend class during the day, receiving their regular hourly rate for the time.

Foreman training as conducted in the foreman school of one of the companies consists of training in the company business as a whole. Ten men recommended by the mill superintendent compose each class. They meet twice a week at a suitably located room, and during working hours. The complete course consists of one hundred and seventy-five lessons, and takes two and one half years to finish. In scope it covers all the activities of a foreman in a steel and wire mill, and all the processes therein, but does not go extensively into any one subject.

The course consists of a group of lessons on the following topics:

(1) Study of the fundamentals of physics and chemistry underlying all steel and wire processes.
(2) Technique of steel and wire production.
(3) Management.
(4) Welfare subjects.
(5) General engineering problems in the construction and operation of a plant.
(6) Business English.

The printed unit lesson system is used in general, but standard works on different subjects are used as texts. The class hour, or the recitation, is divided into periods for free discussion, quizzing, and demonstration and lecture. The members are graded according to educational record, service

record and observed characteristics. These ratings are filed and make a valuable index for reference in case of promotion. Upon completion a diploma is given to each student.

The technical graduate school, or special training school, under observation in the Pittsburgh District was of the study-practice type, a scheduled work program through the shop being accompanied by group instruction. The purposes of such schools are three:

(1) To prepare for a specific task.
(2) To instruct in the company business and processes.
(3) To prepare for advancement.

The main purpose of this school is to give an insight into the business as a whole. A complete description of the school is given in tabloid form.

Characteristic features:
Students' time partly productive;
Attendance on related instruction work is compulsory;
Students are selected by the company;
Instruction work is given on company time;
Students receive pay while taking the course;
Length of course one year;
Instruction work is done in groups;
Varied work assignments under actual working conditions;
Great variety of experience in comparatively short time.

Students:
Graduates of technical schools;
Selected by training department.

Educational methods:
Definite plans for entire course;
Training department shifts men to give a variety of experience;
Work assignments chosen on account of their value as experience;
Order of taking up various work determined by training department;
Reports on work done in various departments;
Outside reading required;
Observation trips to related work;
Talks and conferences with instructors and company officials;
Records kept of success in educational work;
Reports received from departments in which student is working;
Full-time instruction on study work;
Specially prepared work schedule.

Expense:
Charged to general administration;
Prorated to departments using the student permanently;
Remainder charged to training department.

Results:
Employee's fitness for a particular part of the business discovered;
Basic foundation for future specialization laid.

Factors controlling the success of the plan:
Selection of the students;
Definite plans;

Closely related instruction;
Co-operation of all departments.[5]

Before specialization is allowed, the graduate is given a general training during which he is routed, according to prearranged schedules, through the various manufacturing sections, spending about one month in each of the major units. This general training in the constructive feature of the electrical industry lasts from three to five months. The student then goes to the second phase, the operation side, and spends from three to six months on the testing floor. Actual experience in a large number of type apparatus is provided. The last one to three months of the student's course is spent in intensive study of the special field which he has selected after obtaining the general knowledge and practical work afforded by the routing experience.

This finishes the consideration of the corporation school types in the Pittsburgh District. One of the most significant results of the movement in the district is the rise of a spirit of co-operation between industry and public school, and the establishment of an industrial and public school relations committee. Brief description of the background, organization and aim of this section is here presented.

Characteristics of our modern civilization are typified by such words as specialization, complexity, diversification, interdependence. Inventions and machinery, accompanied by volume production, increase in quantity and quality of human wants demanding to be satisfied, transportation and communication facilities—all have developed in the past few decades. Realization, in relatively full measure, has caused the present character of our environment and of our human relations. It has meant in past years an exaggeration of material progress, and of the desirability of its attainment through the crudest, quickest and easiest ways possible.

Our public school system evolved with the growth of our civilization. It has become established as an institution to meet the needs of each rising generation. The income of, and the specialized development attendant upon, the machine age, however, has been so rapid that the school systems have not yet fully been able to adapt themselves to the complex change, and to establish a type of education which will meet the requirements of that part of our population which is so vitally connected with industrial work.

That school administrators, school boards and the public

[5]National Association of Corporation Schools, *Proceedings*, 1916.

in general realize this need for a new type of training, that they are aware of some lack in present educative processes, is evidenced by the rapid development in the past ten years of new kinds of secondary schools and courses, bringing the cosmopolitan high school, the household arts high school, the manual training high school, the commercial high school, the agricultural high school, and the trade and industrial high school.[6]

With the opening of the twentieth century, modern manufacturing methods had destroyed the old type of apprentice training without readjustment on the part of the schools to meet the new conditions. Under the old apprentice system the trade knowledge and the industrial or vocational training of the new entrants into skilled work had been supplied by the master. New conditions and inventions separated worker, manager and owner, eliminated many of the old trades, and made impossible vocational education as operative under old processes. Because of our enormous resources, our unlimited supply of land, our isolation through distance and tariff, our ability to sell surplus goods to Europe, there has not been brought home to us the necessity of that economy of production that is only secured through the building up of an intelligent industrial class of workmen obtained by broad and specialized trade education. Post-war days and the breaking down of national barriers have brought international relationships, and have brought about competition with European methods and industrial processes made highly efficient, economical and refined through their application by workmen trained in a well-developed vocational education system.[7]

It is in the last ten years that trade and industrial high schools and industrial courses for vocational education have sprung up. In 1881 the first trade school in the United States was established privately in New York. By 1900 six such schools were in existence throughout the country. From 1902 to 1917 there was a period of investigation and discussion, bringing many reports upon European systems. Massachusetts, Wisconsin and New York led the way by passing trade school laws extending aid to local school units. In 1913 a National Commission on Vocational Education was appointed to study the situation. The commission found that 12,500,000 persons were engaged in agriculture, and 14,250,000 persons were engaged in manufacturing and mechanical pursuits. Not over one per cent of this total number had

[6]Cubberly, E. P., "Public Education in the United States."

[7]Glynn, F., "Some Trade Schools of Europe," Government reprint.

had any opportunity for adequate training. Vocational training for the members of this group would have meant an increase in the total earnings of the group of at least $750,000,000 per year.[8] As a result of such investigations, Congress, in 1917, passed the Smith-Hughes Bill providing for federal aid in respect to the salaries of teachers in agricultural schools, the salaries of teachers in trade and industrial schools, and the expense in connection with the training of vocational teachers.

However, despite local action and federal aid, there is noticeable lack of plan, lack of standards, and lack of knowledge as to just what the final status of vocational education in the United States public school systems will be.

The logical way to solve the problem is through the united deliberation and action of industry and school. In fact the best plan will only be found through the co-operation of public school officials and industrial executives. One difficulty in the past has been that, although it was easy to secure definite school representation, it has been impossible to secure inclusive, complete and authoritative representation from industry. The National Association of Corporation Training has provided a medium through which this is taken care of in part by appointing a Committee on Industrial and Public School Relations, with representatives from industrial corporations and public schools.

It is believed that the best, the most practical and the most adequate solution of the problem of vocational education can come only through a working together of industrial and public school men. Is there any such co-operation in Pittsburgh, and if so what is its present status, aim and scope?

Pittsburgh has an active chapter of the National Association of Corporation Training. Pittsburgh also has a Board of Education and a superintendent of schools who are sympathetic with an extensive program of vocational education. Four years ago it was suggested that an Industrial and Public Schools Relations Section of the chapter be formed to bring closer together industrial and public school men who were interested in employee training. This section was organized at that time. The first years of its existence were spent in getting school men and industrial men acquainted with each other, and with the problem. Past work consisted of a preliminary survey of the situation. This year definite work was undertaken so that by the end of the study results could be presented to member companies and to schools which would indicate in clear fashion principles along which future

[8]Cubberly, E. P., "Public Education in the United States."

development of the public trade school and the corporation school could proceed with the greatest efficiency, and with the most assurance possible of lasting and beneficial returns.

To be able to obtain data which could be organized to show clearly the method of future procedure on critical points, it was decided that the work of the section for the year should consist of finding out:[9]

(1) What educational training each member of the various trades should receive to be one hundred per cent efficient.

(2) What opportunities in the way of possible number of new entrants each occupation offered per year.

(3) What facilities in the way of material equipment and teaching equipment the public schools offered for trade training.

(4) What training the industrial concerns would give or were giving, and how far the various companies would go in co-operation with the public school to solve the problem through a practical plan.

With the purpose in view, then, of developing a vocational education program for Pittsburgh, four committees were organized to accomplish the project. These major committees are:

(1) Committee on Vocational Analysis.

(2) Committee on Vocational Demands.

(3) Committee on the function of the Public School in training for Vocation.

(4) Committee on the Function of the Industries in Providing Training for Employees.

The section as a whole, composed of over one hundred members, meets once a month to receive reports of progress.

1. Committee on Vocational Analysis

The purpose of this committee is to determine the nature and amount of education and training which skilled workmen should have to reach their maximum productivity and efficiency. In order to do this, information is being collected on the following points:

a. A definition of the occupation, including a brief summary of general facts concerning it.

b. Duties of those engaged in it.

c. Knowledge required about the industry in general and about the specific occupation in particular.

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[9]National Association of Corporation Training, Bulletin, "Corporation Training," January-February, 1922; Leavitt, F.

d. Educational requirements, with particular reference to education in the theoretical aspects of the occupation.

e. Promotion possibilities.

f. Compensation. How does it compare with other vocations requiring about the same amount of education and experience?

g. Educational requirements, with particular reference to that training which comes from practical experience.

h. Physical requirements.

This material is being obtained through the analysis of twenty-one specific occupations found in typical industries located in Pittsburgh. They are: machinist, electrical, carpenter, foundryman, pattern maker, sheet metal worker, printer, plumber, mason, structural steel worker, stationery, engineer, stenographer, salespeople, clerk, auto mechanic, painter, baker, glass maker, barber, messenger. The information collected and classified will be reducible to statements of the nature of the training desirable and necessary to the proficient practice of the trade. The resulting facts will furnish, then, the actual basis for building up definite training programs for entrants into the various occupations.

2. Committee on Vocational Demands

This committee functions along the line of making a definite objective study of the numbers employed in each of the above occupations. The final goal is to find the total number of young people which enter each trade each year. As a method of doing this, the following questions were asked member and interested companies:

a. What is the total number in each occupation, as described by the section and as found in the list, now in the employ of your company?

b. What is the total number hired each year for each of the twenty-one occupations, including both experienced and inexperienced employees?

c. What is the total number of new employees hired each year for each occupation?

d. What is the total number of employees hired each year by each company in all occupations, i. e., not confined to the twenty-one selected?

The final result will be in the nature of an average amount, or probability figure, of what the demand of each occupation for new workers will be.

3. Committee on the Function of the Public Schools in Training for Vocations

The aim of this committee is to arrive at some definite knowledge regarding the ability of the Pittsburgh school system in its present condition to give trade training. In doing this the following studies are being made through the agencies of sub-committees:

a. Physical equipment available for the purpose of industrial education.

b. Teaching force that could be recruited for courses in industrial education from the present system.

c. Vocational guidance.

4. Committee on the Function of the Industries in Providing Training for Employees

In approaching the problem the committee evolved a questionnaire to be submitted to companies in the district. In this way it was felt that data could be secured which would serve as ground work for establishing some general notion as to the extent which industrial corporations could be expected to provide training, and as to the extent to which they were willing to co-operate in the matter. A preliminary testing indicates that corporations admit the value of more educational training for their employees, but are not willing to establish co-operative schools of their own nor to co-operate with the public schools in a practical way looking towards a solution through the working together of the two agencies.

The result of the work of the section as a whole will be a correlation and reconciliation of the reports of these four committees. The value of their studies as bearing on the main project is without question. The first committee's findings will show what each worker in the various occupations should have in the way of education. This brought into comparison with the number of young people which will probably enter each occupation—as found by the second committee—will be the basis of judging not only the quality of education to be given, but also the quantity of each unit needed. This will serve as an indication of the total amount. The decision as to how much of this the public schools should provide does not rest within the power of such a body. However, through determining what the public schools have available in present equipment (third committee), and through finding out the industrial attitude and present status (fourth committee), it will be possible to indicate some prac-

tical and just line of demarcation, up to which the public schools function, and beyond which industry functions.

These studies are not completed, and will not be finished before next year. Hence the effects on the public trade school and the corporation school are not discernible.

The future of the corporation school is assured in Allegheny County. Its spread depends upon the size of the corporation and of the locality. Small communities cannot be expected to and will not provide a progressive system of industrial education in their public schools. The results of the study in the Pittsburgh District indicate that in such localities large corporations have established and will continue to maintain extensive schools for apprentices, and employees in general. Large cities are rapidly adopting a progressive system of vocational or industrial training. In these places certain types of the corporation school such as the night school and the apprentice school are being displaced. This is evidenced by the fact that all the night schools and apprentice schools found were operated by companies situated in outlying towns, not in Pittsburgh. However, even here such departments as the vestibule school and the training department of stores will not be affected, but will continue to function definitely.

The continuation of the corporation school, in any case, will depend upon its utilitarian value to the particular company. This is judged upon its increasing the efficiency of the individual worker, and of the business as a whole by:

(1) Making available a greater quantity of trained workers.

(2) Making available more men of sufficient ability and training for promotion.

(3) Making an improvement in the product.

(4) Decreasing the labor turnover.

(5) Increasing the intelligence and morale of the employees, thus decreasing waste and accidents.

The best indication that the corporation school is meeting these requirements is its rapid multiplication in the last decade.

Summary

1. Little uniformity exists in the administration of the educational departments of corporations.

2. The educational director has to be a man of high ability who has had technical and collegiate training and shop experience, and is of the executive type.

3. Courses are of the study-practice type and the pure class work type.

4. Length of training period varies from one week to four years.

5. Extrance requirements of students are determined by the educational department.

6. No standard qualifications exist for teachers. Some devote all their time to instruction, others only a part of their time.

7. Practice in regard to text-book usage varies, some using texts, others not using them.

8. Classrooms are located either in the company office building or in nearby public school buildings and libraries.

9. Methods of instruction employed were of the study-recitation, the laboratory, the lecture, the inspection trip and the correspondence method.

10. The training programs of department stores include:
   a. Initial training.
   b. Training on the floor.
   c. Group instruction.

11. Training programs of public utility corporations include:
   a. Plant school.
   b. Vestibule schools.
   c. Correspondence courses.

12. The training programs of industrial corporations include:
   a. Specific job training.
   b. Training in company business as a whole.
   c. Technical training.
   d. General training.

13. A practical study of industrial and public school relations is being made by the Pittsburgh chapter of the National Association of Corporation Training.

14. The large corporation school is found in operation by large companies which are situated in small communities.

THE NORMAL MIND

By Wm. H. Burnham

While the characteristics of the various forms of abnormality have often been described, the characteristics of the normal mind have been taken for granted. As we are concerned especially with the mental health of normal children, it is desirable to consider what is meant by mental normality.

The common aim of education and mental hygiene is adjustment. All are familiar with the idea of development and training as adjustment. We refer to the evolution of the physical organism as adjustment. We think of normal living as adjustment to one's environment, physical and social. We conceive of education as adjustment. Thus a speaker at the recent meeting of the British Association, referred to education as a deliberate attempt at systematic training in adjustment to one's environment.

Everybody today says that education means adjustment. Mental health also means adjustment; and all the forms of mental disorder and the like are now referred to as cases of maladjustment. In all this discussion of adjustment usually there is little that is directly helpful in regard to how children may be trained to make right adjustment and to avoid wrong adjustment or maladjustment, as we call it.

How may adjustment be made? What is the mental characteristic necessary for right adjustment? In a word, what is the essential characteristic of the normal mind? If we go to the books for an answer to this question, what is mental normality, the answer the books give is again adjustment. But this answer, as we have seen, does not make very clear what we really want to know, namely, what is the essential characteristic of a mind that is normal and can make right adjustments and avoid maladjustment? Can we not get some more adequate idea of the essential characteristic of the normal mind? Let us try.

Mental hygiene gets the facts on which it is based chiefly from six sources: (1) physiology and neurology; (2) psychology, normal and abnormal; (3) practical psychiatry; (4) modern sociology; (5) pedagogy and the study of children; (6) ordinary observation and folk thought.

(1) Let us look to physiology and neurology for an answer. Please recall the kind of organism that must make this ad-

justment to environment. We find that the human body is an army of cells, or, to use a better figure, it is a commonwealth of cells.

Modern science has shown the literal truth of the old Greek simile which likened man's body to the body politic. The human organism is a commonwealth of individuals. The number of these individuals is 5000 times greater than the total population of the earth. According to the estimate of Dr. Donaldson, the total number of cells in the entire body is 26,500,000,000,000.

"Thus," to quote Sherrington (6, p. 67-68), "the corporeal house of life is built of living stones. In that house each stone is a self-centered microcosm, individually born, breathing for itself, feeding itself, consuming its own substance in its living, renewing its substance to meet that consumption, harmonizing with its own inner life some special function for the benefit of the whole, and destined ultimately for an individual death. Day-long, night-long, in this commonwealth that constitutes each one of us, there goes forward as in the body politic the subservience of many individual purposes to one, the sacrifice of individual lives for the advantage of the many, and the birth of new units which replace the dead . . . And each of these living commonwealths began its individual existence as a single unit, whence arose the myriads that compose its adult being. Division of labour went on and with it differentiation of structure. A plan informed the mass that otherwise were a mere congeries of cells. There come thus to coexist the lime-hardened tissues of our bones, the contractile cells of our muscles, the conductive cells of our nerves, and so forth."

All of these units must work together for the common good. The functions of all are integrated in a condition of health. Only in disease do some of these cells set up a warfare against the commonwealth, or form a separate revolutionary faction, as, for example, in case of cancer, where a rampant and malignant individualistic growth occurs.

It is noteworthy that this most serious of all diseases is characterized by a growth distinctly dissociated from the normal development of the organism and representing a phenomenon of disintegration. Of this Dr. Seelig says:

"The growth of cancer cells is the most disorderly process conceivable. Of a sudden, and for no known reason, a certain cell makes up its cellular mind to have no regard for the laws governing the growth of the rest of its brother and sister cells. It proclaims itself an anarchist and starts in on a debauch of growth that knows no limit of size and no respect

for the claims or the needs of the rest of the body. Just as the anarchist will do untold and irreparable harm to the social body, unless apprehended early, and properly dealt with, exactly so will the anarchistic cell do equal harm to the physical body, unless it and its progeny are apprehended and properly dealt with."

This integration of the physical organism is well illustrated by its relation to the poisons of pathogenic micro-organisms, as well expressed by Dr. Mott (4, p. 679) when he says:

"The vital impulse is in every part of the body, and it is certain that the more active the vital impulse in an organ or structure, the greater automatically is the supply of oxygen by the blood. Every particle of the body is as much alive as the whole and possesses a bio-chemical memory. In proof of this we know that immunity against disease is due to the body's having once defended itself against the toxins of a pathogenic micro-organism; its tissues are thereby sensitized against this particular poison, so that should the organism again attempt to enter the body, the defensive mechanisms are immediately mobilized and the organism destroyed before it can multiply in the body."

The highest form of integration is found in the master tissues of the human organism, the nervous system, composed of billions of neurones. This is made up of the central nervous system and the autonomic nervous system. According to some students, notably Kempf, the autonomic nervous system was the primitive original system, far older than the central nervous system, and the latter was developed after this. Possibly this may be true; but whatever the genetic sequence, today the evidence indicates that the central nervous system is the controlling system, and its special function is that of co-ordination and integration. No one has shown this so well as Sherrington; and this is the burden of his great book on "The integrative action of the nervous system."

Perhaps a word should be said about this term integration. The derivation of the word is familiar. An integer is a unit; we are familiar with it in the study of integral numbers. An integer has not been broken up into fractions. And again we speak of a man of integrity, that is, one with no break in his character, whose reputation is unsullied. Sherrington uses this word integration instead of the usual word co-ordination, thus putting emphasis on the unity, the wholeness and wholesomeness of the organism under the control of the integrative action of the nervous system. Co-ordination puts emphasis on the parts united, integration on the whole which results from the integration of the parts.

One or two paragraphs from Sherrington's writings express the essential facts briefly and clearly:

"The nervous system is that bodily system the special office of which, from its earliest appearance onward throughout evolutionary history, has been more and more to weld together the body's component parts into one consolidated mechanism reacting as a unity to the changeful world about it. More than any other system it has constructed out of a collection of organs an individual of unified act and experience. It represents the acme of accomplishment of the integration of the animal organism." (7, p. 352.)

"The portion in this system to which mind transcendently attaches is exactly that where are carried to their highest pitch the nerve-actions which manage the individual as a whole, especially in his reactions to the external world. There, in the brain, the integrating nervous centers are themselves further compounded, inter-connected, and re-combined for unitary functions. The cortex of the forebrain is the main seat of mind. That cortex with its twin halves corresponding to the two side-halves of the body is really a single organ knitting those halves together by a still further knitting together of the nervous system itself. The animal's great integrating system is there still further integrated and this supreme integrator is the seat of all that is most clearly inferable as the animal's mind. As such it has spelt biological success to its possessors. From small beginnings it has become steadily a larger and larger feature of the nervous system, until in adult man the whole remaining portion of the system is relatively dwarfed by it." (7, p. 352-53.)

Thus integration is the essential characteristic of the normal body. The study of the nervous system suggests clearly that integration is the essential characteristic of a normal mind as well.

(2) If we turn to psychology and consider the mental processes correlated with the neural processes, we find an equally great complexity. Naturally the mental processes may be as many and diverse as the neural. As Finzi, an Italian psychologist, has pointed out, the processes of the mental life are not static and permanent, but a series of phenomena which appear momentarily, and in an infinitely complicated causal relation, succeed each other in meteoric fashion as the manifestations of force between millions of elements, that is, the nerve cells, affected by an inconceivable number of influences of which he mentions a few, such as pulse and breathing, practice and fatigue; interest, peculiarities of attention, depth of the affective life, the infinite

series of emotions; atmospheric influences, presence of other persons, period of life—such are a few of these influences; and he adds, instead of a single or a number of curves, the variations in the mental life for a single hour would appear on paper like the graphic representation of all the sound vibrations of a Rossinian or a Wagnerian overture for a hundred instruments.

In spite of all this complexity of the mental life there is, however, a unity and relative simplicity. As Finzi further points out, the reaction of the organism limits the effect of external stimuli and the causes of the variations frequently compensate for one another so that all the waves and valleys of the curve move within definite limits, just as the changes of external temperature can change the inner temperature of our bodies normally only within a few degrees. The regulating conditions of what may be called psychic temperature are to be found in the psychophysical fundamental peculiarities of each individual, namely, in human personality.

The most normal form of mental activity, as noted in the laboratory and by ordinary observation, is in the process of attention, in the performance of a serious task. In this process we have an integration of all the mental powers and mental processes so that Professor Royce has rightly described attention as comparable to the tropisms in animal organisms; that is, attention is a reaction of the whole organism both physical and mental, a form of mental integration *par excellence.*

If we turn to abnormal psychology, there is a great literature on mental conflicts, on unwholesome mental complexes, repressed ideas, repressed feelings, psychic lesions and the like. All these are illustrations of various forms and conditions of disintegration of the personality, and indirectly illustrate the need of that unity and co-ordination of the mental and physical abilities that we have called integration. Of such pathological conditions of dissociation and the various forms of maladjustment, this is not the place to speak in detail, but the literature is easily accessible. For many of the less technical examples, one may consult Mental Hygiene, the journal of the National Committee for Mental Hygiene and the literature referred to in its pages; and Dr. Wells has given illustrations in his book on Mental Adjustments. His classification of the various forms of dissociation may be given here:

"We have quoted," (12, p. 156-57) he says, "a possible example of the first kind, in a breakdown of the digestive system. Here a process is dissociated not only from the

personal consciousness (as it is normally), but also from the main tendency to survival. We shall meet a few other examples. In such cases, the distinguishing feature is the dissociation of some involuntary or unconscious function of the organism. Second, the ability to move one side of the body, or the lower half of the body, or to make the movements of speaking, may be lost. It is like a paralysis of the muscles that make these movements. Certain movements of these muscles are lost to the control of the main personality. They are dissociated from it. Third, a patient whose retina is unaffected may be unable to see objects outside the direct line of vision. Though his skin is healthy, he may be unable to feel a touch at some special spot. When this happens, it is a form of sensation, instead of a movement, that is dissociated from the main personality. Fourth, *ideas* may manifest themselves in a great variety of ways, without the main personality's being aware of the ideas. Prince's patient of the bell-towers gave a fair example of this, when her hand wrote automatically something not in the awareness of the then dominating personality. Fifth, the main personality may lose control of the organism, which is then dominated by a system of ideas split off from it. (Somnambulisms, fugues, multiple personality). Sixth, the main personality may be aware of the occurrence of a mental process, but not recognize the existence of the process as a part of the main personality. (Externalization, projection). For example, a patient complains that the 'voices' hurl insults at him. Of course, the voices come from nobody but himself; but he does not recognize the voices as coming from himself."

Besides these pathological forms of disintegration many minor forms appear in normal individuals. The pathological merely show in large letters what occurs in greater or less degree in everybody under certain conditions. Among the more important of these conditions are emotion and passion, especially fear and worry, extreme fatigue, the effects of drugs, indigestion, bad diet, and the like, and besides all these a vast number of minor distractions that have a strangely serious effect in disturbing us quite out of proportion to their real importance. Such are all the little difficulties and annoyances that beset everybody, like those referred to by the cartoonist Briggs as having such an effect that "the day is utterly ruined."

Most serious are the distractions of uncontrolled emotions and passion, the survivals of childish attitudes of selfishness, envy, fear, such bosom serpents as jealousy and the like, and a multitude of inhibitions, unfortunate conditioned

reflexes, habits, etc. All these are disintegrating to the personality.

The evidence from psychology normal and abnormal again points to integration as the essential characteristic of the normal mind. We may then probably describe the normal mind as one in which the manifold impulses and mental processes are integrated for general purposive activity. Here again we can back up the evidence by the testimony of Sherrington. (7, p. 353.)

"The normal action of the mind is to make up from its components one unified personality. When we remember the manifold complexity of composition of the human individual, can we observe a greater example of solidarity of working of an organism than that presented by the human individual, intent and concentrated, as the phrase goes, upon some higher act of strenuous will? Physiologically the supreme development of the brain, psychologically the mental powers attaching thereto, seem to represent from the biological standpoint the very culmination of the integration of the animal organism."

(3) If we turn to practical psychiatry we find that most, if not all, cases of mental disorder are characterized by disintegration of the personality. The whole Freudian literature is full of illustrations of dissociation, repressed memories and affects, and all those skeletons in the mental closet whose disintegrating influence has made them characterized as psychic lesions. On the other hand, psychoanalysis brings about its cures by bringing the repressed associations and feelings into consciousness and by inhibiting their distracting influence by normal fusion with the stream of thought.

In a great number of cases of mental disorder, as we have noted, the best form of cure is re-education, and this consists in an attempt to develop concentration of attention, orderly association, and wholesome interests; in a word, an attempt at developing a wholeness and integration of the personality to take the place of confusion, distraction, interference of association, and the like.

(4) If we turn to modern sociology we find that the permanent existence of a social group depends on community of interests, especially on the integration of the individuals of the group in doing some significant group task.

The highest example of a normal social group is one in which the superior abilities of the different individuals of the group are integrated for a common purpose, and the highest kind of group leader is not one who dominates the group, forcing his own views upon the individuals, but one who integrates the abilities of the different members.

(5) Pedagogy and the study of children teach us that normal children are those who can give close attention, those that can choose their own tasks and work attentively in performing them; and on the other hand we find that the one most serious fault in a pupil is lack of attention, lack of concentration.

This means lack of integration. Many years ago Dr. Triplett (10) made a study in which he asked a large number of teachers to report the most common faults among their pupils. The one outstanding fault mentioned by nearly all the teachers was lack of attention.

A certain lack of integration, it is true, is characteristic of the child mind. A considerable amount of conflict and confusion is common. Especially is this true because the child is largely dominated by native impulses. Control of emotion has not yet been attained, and the higher integration of the personality found in the normal adult who has been properly trained is of course lacking. On the other hand, however, the lack of integration in the normal child is largely a lack of continuity and permanence in the mental impulses and sets of the mind. The mood and the behavior are now this, now that, constantly changing, and few mental attitudes are permanent, but for any given situation the integration in the mind of the normal child is often probably distinctly superior to that in most adults. The child suffers no distraction. His whole psychophysic being reacts to the present situation. For the moment he shows complete concentration of attention; and in children as in animals the better the attention of the child the more promising is he as a subject for training. Thus while the power of integration is undeveloped in children and the higher integration lacking, both in children and in adults alike integration of the personality is the essential characteristic of normality.

(6) The ordinary observation of everyday life and the folk wisdom of countless generations, give significant evidence. Our ordinary words to express mental unity and a normal condition of harmony are poise, self control, self possession and the like. None of them are adequate. The word serenity in its original meaning referred in large degree to this wholeness and unity of the personality, but this too is not adequate. The Platonic conception of harmony of the mental faculties and mental unity and wholeness, represented this characteristic of mental wholesomeness; but the technical word integration seems to be the best term to use in mental hygiene.

The words and phrases used in our daily conversation to characterize the lack of poise and integration of the personali-

ty, give striking expression of the common idea that unity of the personality is the condition of health. We refer to lack of integration as going to pieces, being rattled, going up in the air; and of a man who has suffered a nervous collapse, we say he is all broken up or he has gone to pieces. When a man has lost or never had this integrative ability, we are apt to say, "He is not all there." When a man suffers temporarily from this disintegration of personality and then recovers, we say that he pulls himself together.

The evidence from folk thought, as shown in maxims, proverbs, and the great moral codes, is similar. For example, the old Romans believed that if a general, when leaving his home to enter a campaign, stumbled on the threshold of his house, it was a bad omen. True enough, says Freud, for the stumbling was evidence that the man's mind was not clear and united for the purpose in hand, but some hesitancy and doubt prevailed.

Again as an example from the moral codes it is noteworthy that the Ten Commandments forbid envy, covetousness, and the most seriously disintegrating mental attitudes; and Jesus sums up the whole Decalogue in a positive command for integration of all the mental powers: "Thou shalt love the Lord thy God with all thy heart and with all thy soul and with all thy mind and thy neighbor as thyself."

Another significant piece of evidence from everyday observation is that furnished by the efforts, often pathetic, that we make to defend and protect our own personality. To this end we resent the mention of our faults and weaknesses even by our best friends. Most of us are strangely sensitive to anything that remotely suggests blame or criticism; we shirk responsibility lest blame should result; and if, as often happens, we develop a sense of inferiority in regard to certain things, we over-compensate and become pedantic in the thoroughness of our performance or perhaps obstinate in our behavior. Especially it is the blow at the integrity of the personality that makes the tragedy of failure to be understood and of unjust punishment or blame both in children and adults.

It is to protect the personality that we fool ourselves with excuses for our neglect of personal and civic duty, that we repress the memory of opportunities neglected and of failure in performance. For this the slacker and the neurotic become so clever in inventing disorders and extenuating circumstances. For this the discredited politician makes his pathetic efforts to come back. For this the crook sets a limit to the kind of crimes he will commit and retains some scrap of honor to

float on the citadel of his personality. For this all of us resent any criticism of our real weaknesses and defects.

As Freud has written the psychopathology of everyday life, so some one should write the evidence from everyday observation in regard to what constitutes the essential characteristics of the normal mind. Every teacher could furnish significant facts. All this is best shown by concrete illustration. Only a single case can be cited, this pathological perhaps, but it shows in large letters the sensitiveness that everyone feels in regard to what seems to threaten the individual's own selfhood and personality, although most people are not sensitive to such little things.

I know no better case to illustrate this than that of Harrison Gray Otis Blake, the editor of Thoreau's writings. Mr. E. Harlowe Russell, who knew Mr. Blake most intimately, gave me permission to quote from an unpublished address in which he paid tribute to the beauty of Mr. Blake's character, and described in some detail his characteristic of extreme conscientiousness, in part as follows:

"I never knew a person who avoided with such care every approach to duplicity, prevarication, or inaccuracy of statement, who came so near telling on all occasions 'the truth, the whole truth, and nothing but the truth.' An oath administered to him would have been not merely superfluous but an impertinence. Indeed, the form required of witnesses in court might with propriety have been revised, so as to read, 'you solemnly swear that your testimony in this case shall be like that of Harry Blake with reference to the most trivial circumstance of everyday life.' "

The attainment of perfect peace of mind was, with Mr. Blake, the absorbing passion of life. "At times there was a suggestion almost of insanity in the excess of this craving for serenity, of which he himself was painfully aware, but he knew not how to moderate or control it. Whatever vitiated or obscured in the slightest degree this beatitude of spirit, which he was wont to call 'the vision of God,' was to his whole nature intolerable. It was in order to reach and dwell in this frame of mind that he bent all outward circumstances and conditions and strove to purge his conduct and his inmost thoughts of every disquieting motion and tendency. This was the salvation of his soul; he spoke of it as 'eternal life'; and there was nothing he would not freely give in exchange for it. What aggravated the difficulty of attaining this condition was a lack of the sense of proportion, in consequence of which very small obstructions often appeared formidable to his microscopic apprehension. To reach a conclusion with reference to

the most trifling affairs was always a slow, and sometimes a painful process, because he had to weigh alternatives *separately* and could not put one thing against another and so dispose of both by a process of cancellation. In figuring, he carried his decimals to three places, and seemed always to want to carry them further. Moreover, he had not the power when he made a decision, to put it under his feet and stand upon it; he *had* to take it up again and again and re-examine it.

"No reading, no society, no work, however worthy, was satisfying to his nature if it failed to put him in a serene and luxurious frame of mind. This was the test which he applied to every influence from without and every activity from within—to literature, art, companionship, occupation, revery, everything."

Mr. Blake could not be depended upon to do anything at a definite date. If serene, he would lecture to the Concord Transcendentalists; if not, he must first of all attend to his soul. And his finger was always, as we may say, on his mental and moral pulse.

Such cases are especially instructive; for the experiences always have an affective character. No matter how trivial or banal the issue, as soon as it gets to be a matter of conscience it is significant, for it is a matter of feeling, and threatens disintegration of the personality.

While the evidence is conclusive that integration of the personality is the essential characteristic of the normal mind, and the aim of training in childhood should be to develop this, still one may naturally say that this is a counsel of perfection, that every one is subject to distractions, every one is lacking in the necessary integration of the personality, and that there are all degrees of this essential characteristic; so that the practical question still remains what constitutes the normal mind, what is the standard of normality, for the practical problems of daily life in society.

The answer to this is that the practical test of normality is that stage of integration that enables one to work at a significant task and that ability at adjustment that enables one to earn one's own living and get on peaceably in the social groups of which one is a member.

Roughly normality is a functional rather than a structural conception. We get the best idea of this from considering the physical organs. A normal eye, for example, is not an eye free from defects but an eye that under ordinary conditions can function normally. Practically all eyes, as shown by investigation, have, for example, errors of refraction, usually at least some degree of astigmatism. In most cases, however,

the astigmatism is slight, the eye can make its own correction for this defect, and clear vision is possible without strain. All such eyes are functionally normal, and we shall not be far wrong in defining a normal eye as an eye that can make correction for its own defects and perform its functions in ordinary conditions without strain. The limits of normal variation in the condition of refraction, for example, would be the limits within which variation from perfect structure is possible without interfering with functional ability.

So with the other physical organs, and so, too, with the mind itself. The normal mind is not one that is perfectly integrated and free from defects, arrests of development, or even from attitudes and habits of thought that are similar to those characteristic of pathological conditions, but rather it is a mind that can compensate for its defects and weaknesses, that can correct its own errors and is able to control its pathological tendencies; or, in a single word, a mind that under ordinary conditions can function normally.

That this conception of normality is the only tenable one, seems to have been demonstrated in the war by the fact that every one, even with the strongest nerves, it was found, was likely to break down when subjected to sufficient strain.

Thus theoretically the normal mind is characterized by integration of the personality. From the practical point of view the normal mind has such a degree of integration that it can adjust to the ordinary situations of life, perform some significant task in society, and get on peaceably in the social groups of which one is a member. All this is merely saying in other words what has been admirably stated by Dr. Riggs from the point of view of psychiatry as follows: (5, p. 287.)

"Lastly, to avoid breaks in character, breaks between your ideals and your everyday actions, recognize that your problem is fundamentally the same as every one else's, no matter what your particular job may be. This problem of ours, reduced to its common denominator, is to keep our ideals clear, to adopt purposes that shall serve these ideals, and lastly to make our ideals live in practical, purposive, everyday action. To do this, it is first necessary to accept the material of life as good enough for us, as definitely *our* material, awaiting only our workmanship to be forged into success. This should be our method of making our dreams come true, of living up to our great illusion. Therefore, waste no time in kicking against the pricks. The 'divine unrest' of ambition is a noble spur to better action, but the restlessness of discontent is a miserable state of misunderstanding. Beware the contrary currents of anger, fear, and pride, but turn the

strength of these currents into the channels of your purposes. Do not criticize your part in the play; study it, understand it, and then *play* it, sick or well, rich or poor, with *faith*, with courage, and with proper *grace*."

If then we may take this as representing normality, what can hygiene do to develop integration of the personality and to prevent disintegration and maladjustment? This brings us to the very core of sound education and mental hygiene. The problem is of course a very complex one involving the deeper questions of heredity and environment, the functioning of the endocrine glands, even diet and other factors of somatic hygiene, and especially individual differences, early training and the like; but can not mental hygiene give something simple to begin with, a fundamental point of view from which to study the more concrete problems in detail?

The answer is very simple, so simple that most people will fail to realize its significance. Hygiene and education can give opportunity for co-ordinated activity, physical and mental, in the doing of tasks worth while.

This leads to another more concrete and practical question, namely: What are the minimal essential conditions of human happiness? Reduced to their lowest terms, what are the fundamentally essential conditions of mental health—conditions universal for all, young and old, rich and poor, the educated and the uneducated, the different emotional and ideational types, the individual with robust health and the invalid alike? On the basis of observation and many investigations, the answer may, I think, be formulated very simply as follows: The essentials, without which a person cannot be quite sound mentally, and with which one can have no serious mental disorder, the absolutely essential conditions are three,—a task, a plan, and freedom.

The aim of mental hygiene is the care of the mind diseased, the prevention of mental disorder, and the development in the normal of habits of healthful mental activity. This aim is best fulfilled by the simple method already suggested. Again the aim of education put in its briefest form is the development of permanent interests of healthful, useful character. The development of interest is best accomplished by the doing of significant tasks. Thus mental hygiene and education adopt the same method for developing a normal personality. Both seek to accomplish this aim by the doing of significant tasks.

The great value of the task in training can be analyzed in part as follows: training in the doing of a task demands attention, and it develops vital interests. What a child does in performance of his own chosen task is his own. What he makes

in a certain sense is a part of himself. Usually he should have a task that he can accomplish, in order that he may have the stimulus of success; but even if failure is the outcome, the doing itself contributes to the child's personality.

This is shown in the case of all classes of individuals, in all conditions of life, from the child in the nursery to the great leaders of men in their greatest endeavors. All the heroes of defeat, who have found their reward in the doing itself, whether the outcome be success or failure, who have found the fun is in the fight, who have experienced the fact that the battle for righteousness is worth while for its own sake, all these have written in large letters what is the truth for every individual. All co-ordinated activity integrates the personality. All successful doing develops confidence and strengthens the personality. The spontaneous doing of some great task develops a central interest. Action for the aims of some natural interest integrates the personality. Superiority in something significant develops the social personality. Co-operation in a democratic group, where the individual's superior ability is integrated in the ability of the group, in the performance of a group task, means a healthful relation of the individual to the group and a wholesome social development.

From the point of view of mental hygiene a maximum of freedom is necessary. A condition of mental health means adjustment. Mental disorder is lack of adjustment. The adjustment made by children in the first few years of life is vitally important. No one is wise enough to make it for a child. No one could do it if he had the wisdom. The child must make it for himself. To do this he must have freedom. Any prescription means inhibition. The necessary inhibitions come from the natural conditions of the task itself and a few important commands. If implicit obedience in a few things is inculcated these natural inhibitions are sufficient. At a later period more conventional training is necessary, less freedom and more adjustment. At all stages, however, as much freedom as possible should be granted.

With this training in adjustment and this pressure of convention and formal education, as represented by modern methods of formal training, acceleration and the like, mental hygiene emphasizes the truth that in all this education, this drawing out of the child's abilities, the child should not lose his own soul. In bodily hygiene, in somatic hygiene, we should never forget the familiar words of G. Stanley Hall,—what shall it profit a child if he gain the whole world of knowledge and lose his own health, or what shall a child give in

exchange for his health? Likewise mental hygiene goes back to the more original form of this question. What shall it profit a child if he gain the whole world of conventional adjustments and lose his own personality, or what shall a child give in exchange for his soul?

We may well for a moment turn aside to note the wider significance of all this. The simple essentials mentioned, a task, a plan, and liberty, involve the most fundamental problems in human education and human society, and as regards the personal hygiene of the individual, nothing is more important than what we have summed up under the terms integration and adjustment.

Weak, finite, the victim of unknown forces, over which he has no control, man facing the reality of such facts develops either a wholesome sense of dependence, the essential of the religious consciousness, or else he acquires a sense of inferiority and loses his grip in the inevitable conflict. If rightly educated, he adjusts to his physical and social environment, and if rightly trained he integrates his powers to meet the problems that beset him.

As a result of training there is something more than what is usually understood by adjustment. Although weak, and the sport of unknown conditions and forces, with a span of life too short even to study intensively the personal problems of his own existence and his own health, it is possible for man to develop a wholesome integration which enables him to co-ordinate his powers to meet any situation however difficult, and to do the best possible within the limitations of his own personality, and at least to make a fight worth while for its own sake. And again by right training he is able to develop wholesome social relations and integrate his own little contribution with that of the social groups of which he is a member. The essentials for this training are at once the essentials of sane education and of sound mental hygiene. For both they are the same,—a task, a plan, and liberty.

To preserve the health of a social group the same conditions are essential, a group task and autonomy of the group, freedom to choose its tasks, to regulate its method of work, and so on. Simmel (8), who has made special study of the psychology of social groups, speaks of the existence of a common enemy which the group must fight against as the great condition of preserving, unifying, and solidifying the social group. This is true because the conflict with a common enemy means a common task which is vitally significant. While other tasks may not have as great unifying power, nevertheless, for continuous group activity and the permanence of the group,

a significant peaceful task is quite as good as warfare with a common enemy.

A task for everybody, and a right attitude toward one's tasks, both individual tasks and group tasks, with leaders who can integrate the individual abilities of a social group, means social sanity and prosperity; freedom for each individual child to choose his own task and his own plan means the development of responsibility and initiative and the adjustment of the child to his environment. Do you dare to give freedom to the individual child and to the social group? It is dangerous. Do you dare to let a child choose his own plan when your own is so much better, at least so much more interesting? The scholastic product may suffer if you do. To such questions mental hygiene answers merely by another question: while it is dangerous to let a child choose either his task or his plan, is it not more dangerous to prescribe?

To sum up the whole matter from the point of view of neurology, psychology, psychiatry, and modern pedagogy and modern sociology, as well as from the point of view of the commonsense of all peoples, the evidence points to integration and adjustment as representing the fundamental condition of mental health; and put in its simplest terms, the essentials of the training that gives these fundamentals is the doing of tasks worth while and a maximum of freedom. In the performance of simple tasks the fundamental habits of mental health are inculcated,—attention to the present situation, orderly association, normal reaction to feeling, and the rest, and the attitudes of cheerfulness, service and co-operation, are developed; or, in a single word, integration of the personality is developed.

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THE INFLUENCE OF THE GOVERNMENT ON HYGIENE[1]

By Thomas A. Storey
College of the City of New York

Hygiene, the collection of sciences and arts of preserving health, has been a dominant human conception under one name or another ever since that ancient and unknown date when man first sought to defend and protect himself from injury and death. Personal hygiene for the individual, group hygiene for the family, and intergroup hygiene for the community are as old as the individual to whom life has always been precious; as old as the primitive family, the very existence of which grew out of a compelling need for a group defense for the protection of human life; and as old as the community whose prehistoric advent was the inevitable consequence of natural intergroup necessity and was achieved for the mutual preservation of family and individual life.

In fact, the protection and defense of life is the compelling fundamental and elemental reason for government. Governmental concern in hygiene in a narrow and perhaps obscure sense has existed, therefore, from the very beginning of government itself. This responsibility for the preservation of health has been recognized in a slowly enlarging degree from the rude household and community protections against beasts of prey and human enemies; from measures for the conservation and defense of food and water supplies; and from provisions for the preservation of family unity and integrity in primeval human life to the complicated modern governmental provisions for military and naval defense, for commerce and agriculture, and for all modern developments concerned with the maintenance of national unity and integrity.

With the accumulation of modern scientific knowledge, it has become evident that the preservation of health is not merely a defense against natural adverse forces, beasts of prey, and human enemies. The preservation of human life, the conservation of national vitality, the maintenance of national vigor, unity and integrity have become recognized as matters of much broader governmental obligation and responsibility during the last fifty years of the many centuries that have contributed to the formulation of governmental policies and programs.

[1]Presented before the American School Hygiene Association, New York City, November 18, 1921.

The national disasters of infant mortality, the gross and subtle social damages of malnutrition, the enormous community losses from preventable accidents, and from such avoidable and serious diseases as syphilis, gonorrhea, tuberculosis, malaria, and typhoid; the quantative premature human wreckage from diseases of decay; the terrifying mysterious, wholesale devastations made by influenza and cancer, are all samples of enemies that are more dangerous to human life than were the gross natural forces, the beasts of prey, and the human enemies that figure so impressively and so compellingly in the primeval appearance and slow evolution of government.

Our Government with its inheritance from older governments and with its own constructive statesmanship, passing as it has through the relatively primitive conditions that characterized its colonial beginnings in a new, strange, and savage world, has done much for the preservation of the health of its people. We lag behind other countries in some respects, but on the whole our national intergroup hygiene is of an advanced order. Our Federal laws and provisions recognize the seriousness of the subtle as well as the gross quantative social and national damage of avoidable and preventable disease, and poor health, and of avoidable and postponable death. When the crisis of a fearful war arrives and we face the possibility of national destruction with all the cruelties and sufferings that war is known to bring, we develop a program of national intergroup hygiene that makes our Army the healthiest army of all history despite the fearful calamity of influenza, for which we have as yet no preventive or remedial hygiene.

I do not plan to present a résumé of what our Government has done for the preservation of the health of its people, nor will I attempt to give a complete estimate of what the Government is now doing. But one is tempted to stress at every opportunity, the epochal scientific contributions of men working under the Government, such as, Theobal Smith, and Reed, Carroll, Lazear, and Agramonte. One prefers not to pass unnoted in a presentation like this, the governmental demonstrations of the control of typhoid fever, of syphilis, of gonorrhea, and of small pox; or its successful protection of our people against cholera, yellow fever, malaria, and bubonic plague.

The fact that I can not outline here the work of the Bureau of Education along lines of School Hygiene, or of the Department of Labor along lines of Child Hygiene, does not mean that the Government has not had a powerful influence upon hygiene through those agencies. And the same may be said of other governmental agencies such as certain divisions of the

Treasury Department, the Department of Agriculture, the War Department and the Navy Department.

And a very real story can be told concerning the remarkable programs of hygiene carried on by the General Medical Board of the National Council of Defense, by the Army and the Navy and by the Commissions on Training Camp Activities during the war, and by the United States Public Health Service during the latter part of the war and since the war. Much might well be said of the programs of intergroup hygiene for the prevention, treatment and control of venereal disease, developed by the Government in forty-eight State Departments of Health during the last three years through the United States Interdepartmental Social Hygiene Board and through the Division of Venereal Diseases of the United States Public Health Service, reaching, treating, and instructing hundreds of thousands of men, women and children.

And it is hard not to give here, in detail, an outline of the promising researches in the prevention and treatment of venereal diseases that are being carried out in twenty-three of our best scientific laboratories under grants made by Congress through the United States Interdepartmental Social Hygiene Board. A single one of the forty-three researches supported by the Board may yield results of tremendous and far reaching significance. At present, a single case of syphilis requires a minimum of two years for cure. The cost in money is easily a thousand dollars per case and may be ten times that amount. The cost in time lost, in transportation expense, and in reduced productivity is very great and very hard to estimate. The results of a single research may reduce the cost of this treatment, or reduce the time of treatment, or increase the effectiveness of treatment, or save a part of the gruesome sequelæ whose damages are recorded in terms of sterility, abortion, miscarriage, dead babies, damaged mentality, crippled nerves, heart disease, and apoplexy. Furthermore, every scientific truth gained through these researches becomes the common property and the perpetual possession of all the people, and a permanent addition to the general defense of the common welfare.

And I wish I might discuss here, in some detail, the program of social measures developed by the Government through the Commissions on Training Camp Activities and later, through the United States Interdepartmental Social Hygiene Board, for the protection of soldiers and sailors and civilians, against the carriers of venereal disease.

The Commissions and the United States Interdepartmental Social Hygiene Board have demonstrated that protective

social measures (including law enforcement) are essential to the suppression of gross prostitution and to the prevention of the dissemination of gonorrhea, syphilis, and chancroid through prostitution.

During the period of activity of the Commissions on Training Camp Activities and of the Board, over twenty-two thousand delinquent women and girls were covered by this program of protective measures. In the calendar years 1920 and 1921—seventy-five red light districts were closed, and five hundred and eighty-seven houses of prostitution were closed. During the single month of January, 1921, fourteen hundred and one men were arrested and twelve hundred and fifteen convicted because of their relationship to prostitution.

This Governmental experience in protective intergroup hygiene has established the fact that no municipal, county, or state plan for the control of venereal disease or of prostitution can succeed in the absence of a careful program of protective measures including at least all the elements contained in the program developed by the Commissions on Training Camp Activities and the United States Interdepartmental Social Hygiene Board.

Furthermore, this program, or one like it, is obviously essential to the best success of any community plan for the protection and defense against other social diseases, such as, tuberculosis, or hook worm.

But in addition to all these activities carried on under the Government, there has been developed within the last three years, another program which gives the very greatest promise of future influence upon the standards of hygiene in America.

The most effective influence and the influence that will eventually go farthest toward the acquisition and preservation of national health, will come out of the program of educational hygiene proposed and extended by the Government through the United States Interdepartmental Social Hygiene Board in 1919, 1920, and 1921.

This program of educational hygiene was advanced by the Board for the purpose of establishing or enlarging Departments of Hygiene in normal schools, colleges and universities that would enable the educational institution concerned to place before its student body the best presentation of the sciences and the arts of preserving the health, making certain that this presentation would not discriminate against the hygiene of the venereal diseases, gonorrhea, syphilis and chancroid. The departmental program proposed was to be a whole program with no discriminations.

In entering into these agreements with normal schools,

colleges, and universities, the Board was particularly careful to respect with absolute fidelity the local educational independence of each institution. A departmental organization was proposed but details of its educational content were made the obligation and responsibility of the institution that joined the Government in a realization of its plans.

Under this program of the Government, forty normal schools, colleges and universities agreed to organize and establish departments of hygiene for the instruction and training of all students, men and women, who may enter therein in any of their departments and especially of those who enter for the purpose of preparing themselves as teachers. These normal schools, colleges and universities agreed that their instruction and training in hygiene would conform in the general plan and requirements with the organization suggested by the U. S. Interdepartmental Social Hygiene Board; and each of these institutions of higher learning agreed to make every reasonable effort to secure and maintain a fine quality and a high standard of instructional service in its department of hygiene; and each institution pledged itself to make every reasonable effort to maintain its department of hygiene as a permanent part of its organization.

The program of the Board proposed for each institution an integrated organization of all its hygiene factors and resources, respecting always, however, the administrative traditions and administrative problems of the institution itself. The Board expected each institution receiving aid to bring about an equal efficiency of all the factors in its departmental program and to achieve as completely and rapidly as possible the benefits of this unified organization in accordance with its own traditions and its own special conditions.

The departmental divisions proposed by the Government were:—

First: A division of informational hygiene which included (a) a presentation of the principles of general hygiene, individual hygiene, group hygiene and intergroup hygiene; (b) a presentation of the principles of physical training; and (c) the informational findings of carefully conducted health examinations.

The second departmental division proposed was called the division of applied hygiene. This division included (a) health conferences and (b) physical training and all its subdivisions, such as gymnastics, aquatics, sports, games and athletics. Institutions having provisions for remedial and corrective hygiene, such as clinical and hospital facilities, would include those activities under the conception of applied hygiene.

The third division proposed was concerned with the accumulation of reliable records of departmental activities and influences. This division was called the Division of Records and Planning.

In accepting this organization, these institutions further agreed to the following standards for the regulation of the selection of departmental personnel:

(1) That the Director should be selected because his scientific training and special experience fit him for supervision, leadership, research and teaching and for administrative responsibility.

(2) That the teachers of hygiene and physical training employed should be selected with special reference to their wholesome influence on students and because of their ability to make successful use of their peculiar opportunities, to emphasize appropriately and with due proportion, proper tact and with persistency, the serious importance of the venereal diseases, their causes, carriers, injuries and preventions, while they emphasize at the same time the other important facts and applications of general, individual, group and intergroup hygiene.

(3) That a co-ordinator will be appointed who will serve to influence every teacher in every department on the entire staff of the institutions to meet his obligations in relation to the individual hygiene of the students in his classes and to the sanitation of the class room in which he meets his students.

With possibly one or two exceptions, every institution that entered into these agreements with the Government has made a real advance in its organization for effective instruction in hygiene. A report covering this work for the year ending June 30, 1920, may be secured by application to the U. S. Interdepartmental Social Hygiene Board, Washington, D. C. The report for the year ending June 30, 1921, is now in press.

With the withdrawal of governmental support, there has come an increase in institutional support, and in some cases the added institutional support has exceeded the governmental support that has been withdrawn.

In practically every case the financial resource supplied by the institution has been increased during the period of governmental help. The total investment made by these institutions has exceeded their original investments by more than 50%.

The influence of the Government through this educational program has reached forty institutions of higher learning, as stated above. The departments of hygiene organized or enlarged in these institutions have stimulated other normal

schools, colleges, and universities to improve and extend their own departmental organizations.

Fifty thousand college men and women are being reached by these departments this year. The ever continuing flow of young men and young women through these departments will supply the general public with an endless and growing stream of more completely informed citizens whose standards of hygiene will become the standards of the nation.

Harvard, Cornell, the State Teachers College in Albany, N. Y., the University of Utah, Nevada and Oregon, and each and every one of these institutions influenced in this program has a never ending future. Oxford, Cambridge and Paris have centuries of history behind them. Who will say there is not even more history ahead of them and of us? And who will say that the demonstrated utilities of these forty departments will not stimulate a like beginning and a like progress in ten times that number as the hands of time move on?

The college man and the college woman are influential factors in the state and the nation. They establish standards of home hygiene. They become the teachers of teachers and the moulders and fashioners of educational hygiene in the schools of the land. They are the source of support for wise policies of public health in the municipality and in the commonwealth. The college graduate of tomorrow will give and demand a better public hygiene and he will give and demand a better standard of private hygiene. The public health official and the physician in private practice will have a supporter—and a critic!

Viewed as final achievements, the results of the last three years are far from satisfactory. There is not a single institution that has perfected its departmental organization or its instructional program in hygiene.

But as a record of progress toward an ideal, these three years are full of satisfying promise. No two of these institutions are alike in their departmental development but every one of them has made a step toward permanent improvement in one or more phases of organization for instruction in the principles and practices of hygiene.

In summary it may be stated that through this program, the U. S. Government has proposed a plan for the organization of complete departments of hygiene in higher institutions and that this plan makes use of all existing factors of hygiene within the institutions concerned. The plan does not so much contemplate the organization of new departments as it does a reorganization, combination, and utilization of existing facilities and resources. The Government makes no attempt to

dominate or direct local policies and it depends upon the instructional resource and intelligence of the individual institution for the detailed organization of the department and for the selection, preparation and method of presentation of curriculum content.

For the benefit of these departments and in the interest of better instruction, the Government has put out a syllabus for the use of teachers of hygiene. This syllabus organizes the subject matter of hygiene into a systematic and orderly sequence covering the whole field and preparing a place for whatever additions the science of the future may make to our store of knowledge in hygiene.

And so the United States Government has added a relatively new defense for the protection of its communities, its homes and its people. It is encouraging physical training and other constructive hygiene measures for the making of vigorous men and women. It is stimulating defensive and remedial hygiene for the conservation of human life, and it is producing a discriminating public intelligence that ultimately will demand a high standard of public health protection and private health practice.

BOOK NOTES

Drake and the Adventurer's Cup. By Isabel Hornibrook. Bost., Little, Brown, 1922. 309 p.

In this story the author has written a thrilling tale with an extraordinarily vivid setting, a tale which trails a lively trio of Academy seniors, migrated South with the birds—for their winter term at Mosquito Inlet, Florida East Coast—into the very heart of the Big Cypress.

The Adventurers' Cup, a silver cup offered to the senior who could tell on Commencement Day the best story of Life, humorous, thrilling, or pathetic, in which he himself has figured, is the prize each senior ardently hopes to win; wherefore this Easter expedition into the heart of the Big Cypress in search of adventure worthy of the silver cup. Within the swamp every advance is hotly disputed by some denizen of the jungle—deadly "Cotton Mouth," bull-aligator, she-bear, panther, outlaw plume hunters. But it is to Drake, true scout and adventurer, that the coveted cup is finally awarded, because in his adventure he has served Life, with insight and with pluck, by capturing in his lonely lair at the heart of the Big Cypress, the "loco" nature wizard and uniting to him the nature-loving "Waif of the Curious Curves," his long-lost orphan grandson.

Every boy scout will want to read and own this book by Isabel Hornibrook, not only because of the excitement it affords for the moment but also because of its permanent value in the strengthening of his scout ideals of loyalty to all that is best in life, and in the accumulation of scientifically accurate nature lore in which this book is extraordinarily rich, the author having herself spent a winter in Florida and consulted the field notes of a resident ornithologist in order that her stage setting might be a truthful portrayal of that marvelous sub-tropical fairyland, Florida.

Frederica F. Kraus.

Elements of Scientific Psychology. By Knight Dunlap. St. Louis, C. V. Mosby Co., 1922. 368 p.

This book by one of the leaders of American psychology is too important to be reviewed in these brief notes. "Psychology is today a science of the conscious responses of the organism and as such is called upon to furnish materials applicable to the problems of physical science, education, industry and the arts, and to social problems." Only the modern form of psychology can contribute to these effectively. "No one thinks today of asking aid in any problem of real life from the psychology, however named, which deals with the peculiar world of psychic objects, by the introspective method, or by any of its later substitutes." This book deals only with the general problems and leaves applications to other textbooks.

Introductory Psychology for Teachers. By E. K. Strong, Jr. Baltimore, Warwick and York, 1922. 255 p.

This is the third edition of a book that appeared in 1919 without much change. The two books treat, the first of thirty topics beginning with what is psychology, and the second with twenty-eight other topics. The aim of this course is radically different from that of preceding ones. The student is immediately introduced to the problem of behavior as a whole, and when he is a little at home in this he is given a psychological back-

ground. The scope of the book is broad, including both theory and practice, the style lucid; there is a good index, and a few curves, tables, and illustrations.

The Organization and Administration of Physical Education. By JESSE F. WILLIAMS. N. Y., Macmillan, 1922. 325 p.

The development of physical education in this country has been desultory; but there is a different temper today, and a great variety of work is offered. This book hopes to set standards, help state facts, suggest tests and guides, etc. After a general chapter and another on guiding principles in organization and administration, the work proceeds to discuss objects, contents, and material activities of gymnasia and playgrounds; organization of a department of physical education; teachers and supervisors; judging the work, administration, athletics, sports, games, contests, credits, attendance, roll taking, determination of the health of schools and efficacy, etc.

The Psychology of Singing. By DAVID C. TAYLOR. N. Y., Macmillan, 1922. 373 p.

There is a real gap between the accepted theoretical basis of instruction in singing and the actual methods of vocal teachers, and it is this that this book attempts to fill and to reduce theories to a satisfactory science of voice culture. Part I deals with modern methods of instruction in six chapters, Part II gives a critical analysis of them in five chapters, III is on the basis of a real science of voice in six chapters, and IV on vocal science and practical voice culture in nine chapters.

The Reading Process. By WILLIAM A. SMITH. N. Y., Macmillan, 1922. 267 p.

This book is not primarily a treatise on the methods of teaching reading but on the principles that underlie the method. It seeks to furnish a body of information psychological, philosophical, historical, and experimental which will enable the teacher to develop and use methods intelligently in place of accepting them blindly. Special attention is given to language, written and spoken; spelling; teaching beginners to read; analysis of the process; silent reading, content, and tests of measuring reading ability.

Acquiring Skill in Teaching. By JAMES R. GRANT. Boston, Silver, Burdett, 1922. 222 p.

The purpose of this book is to guide the reading, thinking, and practice of student teachers and teachers in service, each chapter being preceded by a number of short pedagogical statements.

The first chapter is general, on the teacher, the school, and the community; the second, principles of education and administration; then follow chapters on the technique of teaching, school hygiene, and human nature.

The Output of Professional Schools for Teachers. By CHARLES E. BENSON. Baltimore, Warwick and York, 1922. 88 p.

After a statement of the problem and source, Part II discusses results in (a) types of schools served, (b) the specific administrative, supervisory, and teaching positions filled by the graduates, (c) their distribution according to the curricula completed, length of service, etc., while Part III is devoted to interpretations, conclusions, and suggestions. The themes are illustrated by various charts and tables.

High Schools and Sex Education. Ed. by BENJAMIN C. GRUENBERG. Washington, Govt. Printing Office, 1922. 98 p.

In Part I are treated general aspects, including sex education in the high school, methods and supplementary devices, teacher preparation and co-operation. Part II discusses the subject in connection with other topics—biology, general science, physiology, physical education, economics, social studies, English, with an appendix on emergency devices and the outline of a summer-school course. The Introduction considers the subject in general.

A List of American Doctoral Dissertations Printed in 1920. Prepared by MARY W. MACNAIR. Washington, Govt. Printing Office, 1922. 179 p.

Supplementary lists were printed in 1912, 1916, 1918, and 1919. In many cases a few lines are given to indicate the drift of the various theses.

Textbook Selection. By R. H. FRANZEN and F. B. KNIGHT. Baltimore, Warwick and York, 1922. 94 p.

This work treats of the criteria for the selection of textbooks. Chapter 2 applies the condition of interest to high-school English literature texts, Chapter 3 to elementary geography. It would seem that this method should be extended to textbooks in other subjects.

The Modern Idea of the State. By H. KRABBE. Tr. by George H. Sabine. N. Y., Appleton, 1922. 281 p.

This remarkable work, with eighty-odd pages of introduction by the translator, describes the new conception of the state which is taking the place of the old idea of sovereignty which prevailed under monarchy. To the author the state is essentially a legal community or a law-creating personality subject to its own law, which expresses its collective interests, and nothing more.

Why Wars Come. By Rear Admiral A. P. NIBLACK. Boston, Stratford Co., 1922. 165 p.

This book is a serious attempt to analyze some of the most important causes of war with a view to avoiding the dangers which lurk in policies which are not altruistic and are not based on the Golden Rule. It is an interesting, well-printed, and timely little volume.

The Validity of American Ideals. By SHAILER MATHEWS. N. Y., Abingdon Press, 1922. 207 p.

The ideals are individuality, democracy, the written constitution, and co-operative sovereignty. But America itself is the highest of these ideals. The test of an ideal is whether it works well as an hypothesis. The problem of the melting pot is really at the root of all our problems now. To many who have lately come upon our shores this country is the synonym of the Holy Grail. But we are doing very little to inculcate anything more than an acquaintance with our language and with some bread-winning art. We must teach all to (1) recognize social responsibilities as the correlate of liberty; (2) law must be respected, although at the same time it is subject to change; (3) the agents of public opinion must be freed; (4) respect for personality must be seen to be the final goal of life; (5) public education must be in the hands of those who believe in Americanism; (6) while all members of a society cannot rank high on any scale, certain moral qualities must be maintained; (7) present imperfections must suggest betterment.

America has advanced hitherto by means of instinct and feeling rather than in response to hereditary leadership. If this mass movement is not intelligent and moral we are lost. We all outgrow Greenwich village.

Constitutional Government in China. By W. W. Willoughby. Washington, Publ. by Carnegie Endowment for International Peace, 1922. 61 p.

This booklet discusses present conditions and prospects, government since 1912, outline of events since 1911, the preparedness of the Chinese for republican government, and finally the present outlook, ending with the outline of the Consistorium.

Russia Today and Tomorrow. By Paul Miliukov. N. Y., Macmillan, 1922. 302 p.

This is a reprint of the author's Lowell Lectures given in the fall of 1921, with material additions. It shows the inevitableness and the long prehistory of the Revolution, why the bolsheviks got the upper hand, their régime, relation to the nationalities, foreign policy, anti-bolshevik Russia, the decline of the movement, the famine, Russia's contribution to the world civilization, the best chapter perhaps being "Russia Tomorrow." While severely criticizing the bolshevik movement, the author believes it is a *fait accompli*, has come to stay, and that this fact should be recognized and the efforts of practical men bent to broadening its policy, which must be done before there can be any substantial affiliation between it and the peasants, whose interests will forever be dominant in that country.

The Vitamins. By H. C. Sherman and S. L. Smith. N. Y., Chemical Catalog Co., 1922. 273 p.

It is often a reproach that the ultimate elements in the three vitamins cannot be analyzed so that we have no chemical formula of them. But this is true also of various toxin and other elements, the utility of which no one longer challenges. The authors hope in this book to stimulate quantitative research as distinguished from merely qualitative tests which have now largely served their purpose. There is a copious bibliography down to the end of 1921. After an historical sketch there is a special chapter devoted to the anti-scorbutic vitamin B; then follows one upon the same action of vitamin C. Chapter 4 discusses the fat-soluble vitamin A; and the fifth chapter, with which the reader is advised to begin, deals with vitamins and the problem of food supply, summarizing the nutritive requirements and the group of food material according to nutritional characteristics, giving also the relative richness of different foods in each of the vitamins and the place of each type of food in the diet.

The General Problems of Psychology. By Robert MacDougall. New York University Press, 1922. 456 p.

This book, without a single diagram or a preface, and without the best kind of get-up, does not seem very attractive to the beginner in this subject, while the very general approach and standpoint of the author are not such as are calculated to stimulate great initial interest. The introductory chapter deals with the general problems of science, the next with the general task of intelligence. Then follow chapters on the abstractions of reflection, the approach to empirical truth, psychology and the system of knowledge, the self of intuition, the arts of life; the field of psychology, its limits, methods, data, and problems.

Texas the Marvellous. By N. O. Winter. Bost., The Page Co., 1916. 343 p.

This elegant and expensive book gives us a comprehensive picture of the state with its history from the first Spanish settlement and the establishment of the Indian missions to the present time, with an account of those who have contributed most to the upbuilding of the state from LaSalle to Sam Houston. The type and paper are the best, and there are very many full-page illustrations, some of them colored.

Australasia, 1668-1911. By A. W. Tilby. Vol. 5 of *The English People Overseas* series. Lond., Constable and Co., 1912. 446 p.

This volume deals with the invasion of the Antipodes, the pacification of Australasia, the birth of the Australasian nation, the Pacific Ocean and the dominion of New Zealand. It deals also with the foundations of new English settlements by the old British stock. The author found great difficulty in old newspaper files and mildewed forgotten pamphlets and records of travelers. The work, however, although chiefly devoted to administrative aspects, contains much anthropological material of great interest.

Peru. By E. C. Vivian. South American Handbook series. N. Y., Appleton, 1921. 235 p.

It was an admirable and timely plan to project this series, and the volumes that have so far appeared in it are well calculated to give the rapidly increasing number of business men, scholars, and statesmen a better knowledge of Latin America than was accessible here before. Maps and illustrations add materially to its value.

A Sketch of Chinese History. By F. L. Hawks-Pott. Shanghai, Kelly and Walsh, 1915. 215 p.

This is a most interesting epitome of Chinese history from 1122 B. C. on, the main divisions being the conquest of China by the Chinese, the first struggle with the Tartars, and finally the struggle between the Chinese and the Western European nations from A. D. 1662 to the present time. Five interesting maps elucidate the story, which comes down to the establishment of a parliament and which sets forth the chief problems now facing the country, viz., an ignorant electorate, national credit, the harmony between the provinces and central government, the avoidance of overpopulation, how to harmonize the new and the old, and how to leaven the country with religious and moral principles that will keep it from falling into the slough of materialism. The great misfortune of the republic is that it came to power just at the time when China was shrinking and threatened with loss of control in both Manchuria and Tibet.

The Evolution of Modern Medicine. By Sir William Osler. A series of six lectures at Yale, 1913. 213 p.

These lectures, very copiously illustrated with portraits, diagrams, title pages of old books, etc., were ready for publication directly after their delivery, but the war and the inability of the author to revise, and his final death, have caused this delay.

The author has read deeply in Greek and medieval medicine and tells in a very attractive way the story of the Renaissance and of the rise of anatomy and physiology and modern medicine, with a final chapter on preventive medicine. The whole theme is not only one of the most fascinating for both scientists and humanitarians but is one of the very best types of culture history.

The Theatre of Tomorrow. By KENNETH MACGOWAN. N. Y., Boni and Liveright, 1922. 302 p.

The first part treats of The New Stagecraft, with chapters on the twentieth century theater, the mechanician, electrician, painter, the plastic and the formal stage, the actor reanimated, etc. Part II, The New Playhouse, treats of the eternal theater, the movie, and the new theater. Part III, The New Play, discusses the theater without plays, the twilight of realism, the forum of the future, the content of the future, the drama of intimacy and of crowds, the theater of democracy.

Hawaii Past and Present. By W. R. CASTLE, JR. N. Y., Dodd, Mead, 1921. 260 p.

The author's design is first to tell those who stay at home something about the youngest of American territories and second to help those who are going there to plan their trip intelligently. He does not confine himself to any special phase of the subject but touches upon the people, the history, the army and navy in Hawaii, Honolulu and other towns, the volcanoes, and island life. The book has a number of interesting photographic illustrations.

The New Latin America. By J. WARSHAW. N. Y., Crowell, 1922. 415 p.

The author attempts here to give a general and comprehensive picture of Latin America. His chapter headings are fallacies, fancies, and facts; the end of isolation; changing industries; manufactures and labor; paramount foreign interests; the Monroe Doctrine; international rapprochement; the growth of nationalism; social development; public entertainments and education; cultural development; position of women; as Latin Americans see us.

The New Heavens. By GEORGE ELLERY HALE. N. Y., Scribner, 1922. 88 p.

These three articles are designed to give the layman some more or less definite ideas of the methods, instruments, and results of the study of modern astronomic research. It describes the millions of new stars which become visible with every increase in the power of the telescope, the stages of stellar evolution from the thinnest cosmic gas to dead suns whose light goes out in darkness, and gives rather an intelligent account of the new interference method of Michaelson which made it possible to determine within ever narrowing limits the diameter of stars, light from which takes many hundred thousands of years to reach us.

Some Qualities Associated with Success in the Christian Ministry. By MARY E. MOXCEY, Ph. D. N. Y., Columbia University Contributions to Education No. 122. 1922. 101 p.

Geology and astronomy, which are at the base of all views of the universe, should have some place in the training of ministers. Religion should give fullness of life, and we should know what life is; it is to save souls, and we should know what souls are. Modern languages are generally placed low in esteem, but it is a question whether it will not be more worth while for pastors to know these than the ancient languages. Social forces must, of course, be understood, and the minister should understand and be able to handle ideas as well as practical matters.

An Introduction to the History of History. By JAMES T. SHOTWELL. In Sources and Studies series of "Records of Civilization." N. Y., Columbia U. Press, 1922. 320 p.

Starting with myth, books, writing, etc., we have a section of five chapters devoted to Jewish history, the Pentateuch, formation of the Canon, etc., another five chapters to Greek history, Homer, Herodotus, Thucydides, Polybeus and later historians; to Roman history, Varro, Caesar, Cicero, Livy, Tacitus; Section 5 to Christianity and history, with a postscript on medieval and modern history and methods of interpretation.

American Indian Life. Ed. by ELSIE CLEWS PARSONS. N. Y., 1922. 419 p.

This imposing quarto is composed of treatises by a score or two of experts whose work is divided as follows: 4 write on the plain tribes, 3 those of the middle West, 4 on the Eastern, 6 on the South-West, 4 on the Mexican, 3 on the Pacific, and 2 on the northern Athabascan tribes, with a final article on the Eskimo winter by Franz Boas. Nothing we know gives a more human aspect to or better summarizes the very many studies of Indian life that have been made in this country in the last half century. It is a valuable volume.

The New German Constitution. By RENE BRUNET. N. Y., 1922. 339 p.

Some Problems of Reconstruction. By ANNIE M. MACLEAN, Ph. D. Chicago, McClurg, 1921. 150 p.

Problems in Pan-Americanism. By SAMUEL GUY INMAN. N. Y., Doran, 1922. 415 p.

Silent Reading: A study of the various types. By CHARLES H. JUDD and GUY T. BUSWELL. U. of Chicago Press, 1922. 160 p.

Studies in Observational Learning. By W. F. BOOK, ALICE S. BEARD, and O. R. CHAMBERS. Repr., Bulletin of the Extension Division, Indiana U., August, 1922. 132 p.

Mood in Religion to Performance. By ELIZABETH T. SULLIVAN. Archives of Psychology, No. 53. N. Y., May, 1922. 71 p.

The Influence of Incentive and Punishment upon Reaction-Time. By ALBERT M. JOHANSON. Archives of Psychology, No. 54. N. Y., May, 1922. 53 p.

Some Well-Known Mental Tests Evaluated and Compared. By DOROTHY R. MORGENTHAU. Archives of Psychology, No. 52. N. Y., May, 1922. 51 p.

The Return of Arthur. By IRVINE GRAFF. Boston, The Stratford Co., 1922. 19 p.

John Bascom, Prophet. By SANFORD ROBINSON. N. Y., Putnam, 1922. 53 p.

Michelet's Jeanne d'Arc. Ed. by PHILIP W. HARRY. Boston, Stratford, 1922. 212 p.

Malnutrition and School Feeding. By JOHN C. GEBHART. Wash., Govt. Printing Office, 1922. Bull. 37. 39 p.

Die Münchener Eignungsprüfung für Buchdrucker und Schriftsetzer. By ALBERT HUTH. Leipzig, Barth, 1922. 28 p.

Vergleichend-psychologische Untersuchungen über Kindliche Definitionsleistungen. By HANS P. ROLOFF. Leipzig, Barth, 1922. 168 p.

Annual Report of the Commissioner of Mental Diseases, Massachusetts. Boston, Wright and Potter, 1922. 264 p.

Proceedings of the Society for Psychical Research. Glasgow, Maclehose and Co., 1922. 438 p.

A Life Unveiled. By A Child of the Drumlins. N. Y., Doubleday, Page, 1922. 335 p.

John Burroughs, in his introduction to this book, well characterizes it as the natural history of an American girl in the last quarter of the nineteenth century. Herein we see pictured a typical and representative condition in individuals which contributed to the development of a dreamy, aspiring girl into a woman of serious purpose and substantial achievement in a strenuous and useful career. It seems to be a spontaneous unveiling of memories with entire absence of literary consciousness.

The Dream Problem. By RAM NARAYANA. Delhi, India, 1922. 588 p.

This is the second volume, to which it would seem the first is largely introductory. It is based on conversations between the Sage and the Dreamer, apparently illustrative of the Vedanta philosophy. The book does not aim to found a new religion or divert from other lines, but its dictum is "goal is one for all; the paths that lead thereto are many." "We believe in absolute truth reached by the great silence symbolized by sleep," etc. There are various portraits and biographies of great interpreters, Yogi and others, Orientals and Westerners.

The Psychological and Ethical Aspects of Mormon Group Life. By EPHRAIM E. ERICKSEN. U. of Chicago Press, 1922. 101 p.

This is a remarkably candid discussion of the present conditions of Mormon life and of its conflicts with surroundings, external, political, social, and religious influences, and also of the internal discords between the various sections of the cult.

Spirit. By E. P. S. H. N. Y., Dutton, 1922. 54 p.

Dr. R. C. Cabot thinks this book embodies "a great deal of important truth" with no serious errors of statement. It attempts to prescribe for a long list of mental worries in our nervous age.

An Introduction to Social Ethics: The Social Conscience in a Democracy. By JOHN M. MECKLIN, PH.D. Harcourt, Brace & Co., 1921. 446 p.

Democracy is not negative or a body of rights to be safeguarded rather than utilized. Evolution shows when a land is dynamic rather than static. It becomes real and achieves a place in history by virtue of what it does rather than what it is; just as an individual's own achievement rather than his heredity determines his own place. There is a self-conscious democracy that grasps its ends and conscientiously tries to realize them; it reserves

the right to change its mind or modify its law when the better attainment of these laws makes it necessary. It feels responsible for jeopardizing national integrity by changing its mind, and this is its peculiar virtue. "Law-made" democracy and conscience must pass like childish things which must be put away when we become adults. Democracy is not ultimate, but is a means to an end. It is only one of the many solutions of the basal problems of civilization. It is true not because it reflects an external order, but because of its practical results. The whole body of sentiment must be reorganized and self-conscious.

Education and World Citizenship: An Essay toward a Science of Education. By JAMES C. MAXWELL GARNETT. Cambridge University Press, 1922. 515 p.

This author attempts to interpret the whole psychology of education in neurological terms, and he believes that its end is to bring the individual into *rapport* with the entire cosmos. He advocates a single wide interest and says that "the value of any given expenditure of effort either by teacher or taught or by both, decreases rapidly with the number of separate subjects upon which that effort is expended." "Thus the value of any new subject is in proportion to the square of the time during which the study is continued, inversely proportional to the number of separate subjects into which that branch of knowledge is subdivided."

The Rural Mind and Social Welfare. By ERNEST R. GROVES. Chicago, Ill. 205 p.

This is a capital study of such topics as social contribution of Primitive Agriculture, City Drift, Country Life and Herd Instinct, Instinct of Self-Assertion, The Parental and the Sex Instincts, Fear, Pugnacity, Curiosity, Workmanship, Acquisition, Play, Country Church and the Rural Mind, the Psychology of Rural Organization.

The Social History of the Western World. By HARRY ELMER BARNES. N. Y., D. Appleton & Co., 1921. 126 p.

This syllabus seeks to organize material dealing with the history of western society according to one of the possible lines of attack which may be made by the so-called "new history." Its six parts are: I. Prolegomena to Social History; II. Progress in the Pre-Literary Period; III. The Social History of the Near Orient; IV. Classical Society and Material Culture; V. The Social History of Western Europe During the Middle Ages; VI. The Social History of Modern Times. No American author is more competent or more widely read. Such a manual is most timely, but no even extended review can do justice to it.

Einfuhrung in Die Ethik auf Grundlage der Erfahrung. By DR. G. HEYMANS. Leipzig, 1922. 323 p.

After discussing the problem and method and answering various objections, the author proceeds to treat of the moral judgments in general, their content, object, the psychology of the will, the conditions of the moral judgment, international duty, virtue and merit. In the next part he takes up the criticism of moral judgment, discussing virtues and vices, the ethical wrong way, the hypothesis of general criteria, teleologic criteria, individual and universal hedonism, utilitarianism, the intuitive hypothesis, theories of duty, aesthetic and logical and objective theories. Part 3 discusses the applications to life or ethical practice. The judgment of others, one's own cause, self-education and that of others and finally the self-education in the race.

Die Intelligenz der Kinder und Jugendlichen und die Methoden ihrer Untersuchung. By WILLIAM STERN. Leipzig, 1920. 935 p.

The author first gives an account of the development of intelligence, its idea, conditions, etc. Part II begins with a discussion of methods of investigation, and there are no less than twenty-one chapters on the methods of testing individual functions and six upon the method of proving the accuracy of results. The third part is devoted to the application of results, especially in the school. The social conditions of intelligence are in four sections and the psychological methods of analysis are in four, while eleven sections are devoted to a general survey of tests of writing. This is the best historical account we have. This work really ought to be translated into English. It approaches the subject by methods sufficiently diverse from those we are accustomed to in this country, and its findings and valuations are independent.

The Little Corner Never Conquered: The Story of the American Red Cross War Work for Belgium. By JOHN VAN SCHAICK, JR. N. Y., 1922. 282 p.

This is a story of the American Red Cross war work for Belgium. There are a number of illustrations. The book well sets forth the monumental work of the Red Cross war work. Nowhere was better work done than in Belgium.

The Political Institutions and Theories of the Hindus; A Study in Comparative Politics. By BENOY KUMAR SARKAR. Leipzig, 1922. 242 p.

The learned author starts with a view of comparative politics from Hindu data, their development, the Hindu constitution, its development, property and woman in private law, public law of the Hindus, their machinery of Imperial Nationalism, their Republics. Part II deals with the concepts of Hindu politics, the literature on the subject, theory of the constitution in Hindu political philosophy, property, law and social order and international relations, etc.

The Force of Intercession. By CONRAD H. GOODWIN. Boston. 182 p.

This is a study of the nature and psychology of prayer and answers to it. The importance of the spirit of intercession is that it should be united, that we should think of the solidarity of the race, pray for our enemies and have faith according to reason, etc.

Graded List of Books for Children. Prepared by the Elementary School Library Committee of the National Education Association. Chicago, 1922. 235 p.

This bibliography is by grade from one to nine inclusive. It is followed by a chapter on Reference Books, Out of Print List, Directory of Publishers and Index. It is a descriptive bibliography. Nothing could be more important or more timely than such a publication.

The Call of Education, Vol. I. By J. H. DOYLE. Hammond, Ind. 289 p.

This is Volume I of a promised series, and its sub-title is Biological Integrity. This material seems to be given primarily in form of lectures and discusses the purpose of education, its Genetic Aspects, its Physical Effects, its Relation to Childhood, the Views of Plato, Courage and Cowardice, Introversion, Psychic Re-Education. The purpose concept dominates everything, and its goal is to guarantee biological integrity of individuals. Education must place man far above the popular current standards.

The author's point of view gives this volume a distinctive uplifting character. Even if we cannot agree with the publisher's statement that this is "the book of the century, the first and only book in all history to bring us out of the haze and the maze of the ages," etc., it is a book of rare interest.

La Methode Decroly Amelie Hamaide. Paris. 208 p.

This method has been in operation in Brussels since 1900. A brief account is given of the author, with his portrait and fifty-six illustrations. This method, which is highly indorsed by so high an authority, as Dr. Ed. Claparede attempts to get into closer *rapport* with child nature in primary grades in order to bring the child into touch with life without as well as within school. Perhaps its best results are shown in the creative activity of children's imagination.

Organization for Visual Instruction. By W. H. DUDLEY. Bulletin 1921, No. 7, Department of the Interior Bureau of Education. Washington, D. C. 24 p.

Review of Educational Legislation, 1919 and 1920. By WILLIAM R. HOOD. Bulletin 1922, No. 13, Department of the Interior, Bureau of Education. Washington, D. C. 30 p.

The Mortality of Foreign Race Stocks. By LOUIS I. DUBLIN, PH. D. Reprinted from the *Scientific Monthly*, January, 1922. 103 p.

Preparation of Teachers of the Social Studies for the Secondary Schools. By EDGAR DAWSON, PH. D. Bulletin 1922, No. 3, Department of the Interior, Bureau of Education. Washington, D. C., 1922. 24 p.

The Reorganization of Mathematics in Secondary Education: A Summary of the report by the National Committee on Mathematical Requirements. Bulletin 1921, No. 32, Department of the Interior, Bureau of Education. Washington, D. C., 1922. 73 p.

America and the Rehabilitation of Europe. The Annals, Vol. CII, July, 1922. The American Academy of Political and Social Science. Philadelphia, 1922. 217 p.

The Ethics of the Professions and of Business. Vol. CI, May, 1922, No. 190. Philadelphia, The Annals of the American Academy of Political and Social Science. 315 p.

Supplementary Educational Monographs. The University of Chicago. Chicago, Ill.

No. 18, June, 1922. How Numerals Are Read: An Experimental Study of the Reading of Isolated Numerals and Numerals in Arithmetic Problems. By PAUL WASHINGTON TERRY. 109 p.

No. 19, May, 1922. The Selective Character of American Secondary Education. By GEORGE SYLVESTER COUNTS. 162 p.

No. 20, June, 1922. Curriculum-Making in Los Angeles. By FRANKLIN ROBBITT. 106 p.

No. 21, June, 1922. Fundamental Reading Habits: A Study of Their Development. By GUY THOMAS BUSWELL. 150 p.

No. 22, June, 1922. Remedial Cases in Reading: Their Diagnosis and *Treatment.* By WILLIAM SCOTT GRAY with co-operation of DELIA KIBBE, LAURA LUCAS, LAWRENCE WILLIAM MILLER. 208 p.

The Johns Hopkins University Studies in Education, No. 5. Edited by Edward F. Buchner. *A Measuring Scale for Free-Hand Drawing. Part I. Representation.* By LINUS WARD KLINE and GERTRUDE L. CAREY.

The Achievement of Subnormal Children in Standardized Educational Tests. By J. E. WALLACE WALLIN, PH. D. Miami University Bulletin. Series XX, No. 7, April, 1922.

Das Psychologische Laboratorium der Hamburgischen Universitat. By PROF. WILLIAM STERN, Director. 1922. 40 p.

University of Iowa Studies in Education: A Comparison Between General and Special Methods Courses in the Teaching of High School Subjects. By CARL GUSTAVE FREDERICK FRANZEN. First Series, No. 58, Mar. 1, 1922. 36 p.

Rivista Pedagogica. Anno XV, Fasc. 5-6, Maggio-Giugno, 1922.

Das Kohler-Wertheimer's Gestaltenprinzip und die moderne Tierpsychologie. By PROF. H. DEXLER. Prag, 1922. 227 p.

Algunos Aspectos de la Psicologia del Nino. By HONORIO F. DELGADO with introduction by William A. White. Lima, 1922. 82 p.

The Indiana Survey of Religious Education. By WALTER S. ATHEARN. 39 p.

Die Feststellung der psychischen Berufseignung und die Schule. Von ERICH STERN. Leipzig, 1921.

L'Initiation a L'Activite Intellectuelle et Motrice par les Jeux Educatifs. By DR. DECROLY ET MLLE. MONGHAM. Paris, 155 p.

NOTE

At a Congress held in Munich on December 8 to 10 devoted to comparative individual psychology Dr. Alfred Adler discussed the meaning of personality in present-day psychology, individual psychology and the right of punishment, judges for juveniles, individual psychology and philosophy, the rôle of sensuality in the neuroses, Shakespeare's knowledge of mankind, individual psychology and romantic poetry, nervous and cyclothymic inhibitions of breath, Socrates as a forerunner and prototype of individual psychology, and inhibitions in life and in the neuroses, etc.

ERRATUM

"The Evolution of an Infant's Walking," by Garry C. Myers, in the September issue of this journal is a complete study by itself and not a part of "Infants' Inhibitions: A Genetic Study" as the arrangement would seem to indicate.

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G. STANLEY HALL, Ph. D., LL. D.

WITH THE ASSISTANCE OF

WILLIAM H. BURNHAM, PH. D.

Professor of Pedagogy, Clark University

AND WITH THE CO-OPERATION OF

F. W. ATKINSON, President Polytechnic Institute of Brooklyn; T. M. BALLIET, Dean of the School of Pedagogy, New York University; Professor EARL BARNES, Philadelphia; Professor W. S. MONROE, State Normal School, Montclair, N. J.

MARCH, 1922

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Directory of American Psychological Periodicals

American Journal of Psychology—Ithaca, N. Y.: Cornell University.
Subscription $6.50. 600 pages annually. Edited by E. B. Titchener.
Quarterly. General and experimental psychology. Founded 1887.

Pedagogical Seminary—Worcester, Mass.: Pedagogical Seminary.
Subscription $5. 575 pages annually. Edited by G. Stanley Hall.
Quarterly. Pedagogy and educational psychology. Founded 1891.

Psychological Review—Princeton, N. J.: Psychological Review Company.
Subscription $4.25. 480 pages annually.
Bi-monthly. General. Founded 1894. Edited by Howard C. Warren.

Psychological Bulletin—Princeton, N. J.: Psychological Review Company.
Subscription $5. 720 pages annually. Psychological literature.
Monthly. Founded 1904. Edited by Shepherd I. Franz.

Psychological Monographs—Princeton, N. J.: Psychological Review Company.
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